S. HRG. 113–22

DOE BUDGET FOR FY 2014

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED THIRTEENTH CONGRESS

FIRST SESSION

TO

CONSIDER THE PRESIDENT'S PROPOSED BUDGET FOR THE DEPARTMENT OF ENERGY FOR FISCAL YEAR 2014

APRIL 18, 2013

Printed for the use of the
Committee on Energy and Natural Resources

U.S. GOVERNMENT PRINTING OFFICE

81–214 PDF WASHINGTON : 2013

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON ENERGY AND NATURAL RESOURCES

RON WYDEN, Oregon, *Chairman*

TIM JOHNSON, South Dakota
MARY L. LANDRIEU, Louisiana
MARIA CANTWELL, Washington
BERNARD SANDERS, Vermont
DEBBIE STABENOW, Michigan
MARK UDALL, Colorado
AL FRANKEN, Minnesota
JOE MANCHIN, III, West Virginia
CHRISTOPHER A. COONS, Delaware
BRIAN SCHATZ, Hawaii
MARTIN HEINRICH, New Mexico

LISA MURKOWSKI, Alaska
JOHN BARRASSO, Wyoming
JAMES E. RISCH, Idaho
MIKE LEE, Utah
DEAN HELLER, Nevada
JEFF FLAKE, Arizona
TIM SCOTT, South Carolina
LAMAR ALEXANDER, Tennessee
ROB PORTMAN, Ohio
JOHN HOEVEN, North Dakota

JOSHUA SHEINKMAN, *Staff Director*
SAM E. FOWLER, *Chief Counsel*
KAREN K. BILLUPS, *Republican Staff Director*
PATRICK J. MCCORMICK III, *Republican Chief Counsel*

CONTENTS

STATEMENTS

APPENDIXES

DOE BUDGET FOR FY 2014

THURSDAY, APRIL 18, 2013

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 10:01 a.m. in room SD–366, Dirksen Senate Office Building, Hon. Ron Wyden, chairman, presiding.

OPENING STATEMENT OF HON. RON WYDEN, U.S. SENATOR FROM OREGON

The CHAIRMAN. With respect to the Department of Energy's fiscal year 2014 budget, it's quite clear that our country needs to have a broad portfolio of energy choices. But it can't have that when the Energy Department's budget doesn't fund them. The energy needs and opportunities in Oregon are different from the energy needs and opportunities in Alaska or West Virginia or Louisiana or North Dakota.

It is true that no one has a crystal ball that's good enough to know exactly where technological breakthroughs are going to occur or how energy markets in our world will change. Five years ago when the Congress last enacted a major energy bill, the potential for the kinds of dramatic increases in gas and oil, in gas resources from shale and oil, were unknown. Putting all of our research dollars on a few technologies closes off pathways to other potentially transformative energy breakthroughs.

I understand that proposing a budget is about establishing priorities. The current budget problems require tough decisions. The Department of Energy budget is no exception.

None the less a budget is also about your priorities for the future. I remain concerned about some of the investment decisions that I've seen in the Department of Energy budget. Because I don't think they truly reflect the level playing field that's needed to promote choice and competition in energy and particularly encourage energy investment.

This morning I'm not going to go over the same ground on technologies like energy storage or environmental cleanup that I discussed with Dr. Moniz last week. I think energy storage, which has the potential to greatly improve the economics and challenges of adding renewable energy to the electric system, has been underfunded. Environmental cleanup is not a problem that is going to be solved just by spending more money. I do think it's important to ask for explanations about why the Department of Energy budget

has such dramatic reductions in fossil energy and nuclear energy and to a lesser extent in water power and fuel cells.

The DOE budget never seems to be complete without the Department cutting funding the Congress has added for water power and fuel cells. These are technologies that the private sector is anxious to move on quickly. Our competitors around the world are ramping up their investments in these areas. Despite that, this year there appears to be no exception to what I think clearly are misguided cuts.

Year after year funding for fossil energy research is cut over $74 million, or 15 percent. Sure the fossil budget includes a new program for collaboration with EPA and the U.S. Geological Survey to develop safer fracking technologies. The $17 million budgeted for this program doesn't begin to reflect the importance of addressing the challenges of improving the way fracking is done, encouraging best practices, and the implications that has for U.S. energy production competitiveness.

Year after year funding for nuclear energy research was cut $123.6 million, or 16 percent. In the wake of the decision to cancel the Yucca Mountain repositories, it's hard to understand how it makes sense to reduce funding on nuclear fuel cycle research. Earlier this week the Department announced a program to develop spent fuel storage technologies for high burn-up fuel of $15.8 million stretched over 5 years. Certainly better late than never, but like the Department's efforts on fracking research, the level of effort proposed doesn't seem to me to begin to match the importance of the challenge.

Funding for fusion energy is proposed to increase at almost a half a billion dollars with half of that going to fund the U.S. contribution to the International Fusion Demonstration Project being constructed in France. ITER is now such a large part of the fusion budget that it is quite literally eating up other programs' funding. Even with a large budget increase, the Department is ordering MIT to shut down its fusion research program to save dollars.

The Department has now said that the U.S. contribution to ITER will be capped at $2.4 billion. The last time the Department provided the Congress with an estimate the total U.S. project cost was in 2008 when the U.S. share in this project was estimated to cost less than half of that amount. Fusion may truly be the breakthrough technology of the future, but it's time for Congress to take a closer look at this program-especially the ITER project.

My point here is simple. Not every technology needs to get the same amount of funding. There should be some genuine balance among technologies that reflect their likely contribution to the country's national energy mix. Budgeting priorities ought to also make sure that addressing problems that are already at hand, like fracking or spent nuclear fuel storage, are real priorities, not after thoughts.

We look forward to the Department's testimony. But let me have Senator Murkowski make her opening statement.

Just 2 procedural points that you and I have talked about very quickly, Senator Murkowski.

First, the department cannot do its job without receiving nor this committee cannot do its job without receiving the department's

budget justifications in a timely manner. Senator Murkowski and I feel very strongly that we absolutely have to have that and have to have that level of cooperation.

Second, members of the committee invariably have detailed questions about the budget and the Department's testimony that they submit after the hearings. Last year, the committee did not receive the Department's responses to our budget hearing questions until December, 10 months after they were submitted.

Secretary Poneman, the Department may not completely control all of the issues with respect to the budget justifications when Senators up here ask questions. But you do have complete control when responses to this committee are submitted. For myself and Senator Murkowski, and we've talked about this, it is not acceptable to fail to deliver responses to the committee's questions for months and months on end. That has got to change. I'm going to want your personal assurance that the Department is going to answer the questions that Senators on both sides of the aisle ask in a timely way.

Senator Murkowski, for whatever statement you'd like to make.

STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR FROM ALASKA

Senator MURKOWSKI. Thank you, Mr. Chairman. I'd like to welcome the Deputy Secretary. Appreciate you stepping in to speak to the President's priorities within the Department of Energy.

I want to add to Senator Wyden's comments here in terms of timeliness of responses. I think members take these budget hearings very seriously. We need to understand where the Administration is intending to go with their priorities.

But I think it's also very, very important that the Administration know where we're coming from in our priorities. That is reflected in these QFRs, these questions for the record. So it's not just an exercise where we ask our staff to dream up whatever it is that they think the folks back home want to hear.

These are important. It's important that we receive responses in a timely manner. So I just want to add to the comments of Senator Wyden. Reinforcing that we take these very seriously and the hope will be that the Department will be fully cooperative.

Last year when the Administration's budget came out I expressed disappointment with the overall budget request. This year, unfortunately, is no different. I am again, disappointed.

I've said that as it relates to the full budget, the fact that the budget comes in 65 days after it was due, more than 2 weeks after the Senate has already moved through its own budget resolution. This just make the process a little more complicated. I think you fully recognize that.

But we're sitting here at $16.8 trillion in debt. We've got a budget in front of us that adds more, adds more. It tacks trillions on top of what we already have going forward in this next decade, a budget that just doesn't come close to balancing. So this is tough for all of us as we try to, again, address the priorities but do so in a way that is fiscally responsible.

There's a lot of things that I don't like within this budget. But I'll start off with acknowledging a few areas where I think things are moving in the right direction.

A greater emphasis on research and development, the R and D focus, I think, is just so key, so critical to us as we move toward an energy policy that, again, is affordable, abundant, clean, diverse and secure. It's going to come about through our advances in technology. So I'm pleased with the focus on the basic research. I think it will promote the innovation and the breakthroughs that we need to establish commercial viability.

You've got this new active project management at ERE which will hopefully help the Department become a better steward of taxpayer dollars. I think that that's a good thing.

There's some things that clearly I am not in alignment with the Administration. The chairman has noted that budgets are all about priorities and we look for that. The Administration has said repeatedly that they support an all of the above energy policy. But I don't necessarily see that reflected in this budget here.

Instead it would appear that there is still the favorites even amongst the renewables in the vehicle technologies. One example, the water power account is again cut despite the fact that hydropower is by far our largest source of clean renewable electricity generation.

Then there is the fossil R and D budget as the chairman has noted it remains almost exclusively focused on CCS and a fracking safety initiative. New supply from unconventional resources like methane hydrates, distant afterthought. If it's even an afterthought at all.

Yet that resource could provide natural gas for thousands of years if it's commercialized. Yet DOE is looking at this, says $5 million here is less than .02 percent of the total request. If we're really going to move out and advance some of these breakthroughs we need to show that support by way of the budget.

Also want to mention 2 other areas where I do think that we might be able to find some bipartisan support, but yet I think the Administration has taken a different approach.

The first is energy taxes. Despite bipartisan support for the expansion of the master limited partnerships. Senator Coons is leading on that. I'm pleased to be working with him.

The Administration instead of looking to that is once again going down the same path that we've seen time and time and time again which is singling out oil, natural gas and coal producers with increased taxes. Now I get it. You're looking under every rock to find dollars for an increased budget.

But we've demonstrated before that it's a bad idea. I think it's going to be demonstrated again that it is a bad idea. What we need to do, I think we all recognize, we need to be looking at how we reform a broken tax code. But singling out one industry is not going to get us there. I find it really quite surprising that the budget would make permanent the wind tax credit just months after the industry itself proposed a phaseout there.

Another area where I think we might be able to have some good conversations is in the establishment of a trust fund for energy research. I think it is a logical way. It's an enduring way to boost

funding in that area. I have included it as a part of my energy 2020 proposal. I think that we should be able to find some agreement.

But what the Administration does in its proposal is it takes new production in areas that are off limits. It takes them off the table. I'm looking at this and saying the only way that you're going to really be able to make this work is if you allow for new production and you take some, a portion, of the revenues from that new production. That's how you can fund this.

But if we're taking it from the existing production in this country you're just taking it from some other source that's already committed. So I'm afraid that if that's the approach the Administration is going to take on this it's not going to go anywhere either despite the fact that I think it's a promising concept. So we've got to figure out how we make it all work.

I do appreciate the opportunity to focus on some of the areas that we might be able to help encourage the Administration, ways that we, as a committee, can advance good policy. Again, I appreciate you being here this morning.

The CHAIRMAN. Senator Murkowski, thank you very much for a statement where there were a whole host of areas where I agree. Hallelujah for your throwing in the point about the tax reform and fixing the dysfunction tax system as well.

Senator MURKOWSKI. We're working at it.

The CHAIRMAN. So that's not your—with it Secretary Poneman. We'll let you off the hook on that.

But we welcome your remarks. We'll make your formal remarks a part of the record and look forward to having a chance to have some back and forth on questions.

So, go ahead.

STATEMENT OF DANIEL B. PONEMAN, DEPUTY SECRETARY, DEPARTMENT OF ENERGY

Mr. PONEMAN. Chairman Wyden, Ranking Member Murkowski, members of the committee, thank you for the opportunity to appear before you today to discuss the President's fiscal year 2014 budget request for the Department of Energy.

Let me just begin by thanking the committee for voting to refer the nomination of Dr. Ernest Moniz to the floor. The expeditious treatment of that is something that we're all very grateful for.

The United States is on the path to a cleaner and more secure energy future.

Since President Obama took office responsible oil and gas production has increased each year while oil imports have fallen to a 20 year low.

Renewable electricity generation from wind, solar and geothermal sources has doubled.

The carbon emissions that threaten our planet have fallen to the lowest level in the United States in nearly 2 decades.

In short, the President's approach is working. It is a winning strategy for the economy, energy security and the environment. But even with this progress there is more work to do.

The Energy Department plays a vital leadership role in continuing the significant progress America has made in producing

more American energy, creating the clean energy jobs of the future and increasing energy efficiency across the economy. In total the President's 2014 budget provides $28.4 billion in discretionary funds for the Department of Energy to support its mission to assure future generations may live in a country that is safer, healthier and more prosperous.

As part of the Administration's all of the above strategy, the President's budget request invests in programs that support research and deployment of the energy technologies of the future. These investments will help us double American energy productivity by 2030, save consumers and business money by saving energy and support ground breaking research in innovation to leverage every domestic source of energy from hydrocarbons and nuclear to solar and wind.

The Administration recognizes the government's role in fostering scientific and technological breakthroughs and has committed significant resources so that our Nation can lead the world in the innovations of the future.

This includes $5.2 billion for the Office of Science to support basic research that could lead to new discoveries and help solve our energy challenges.

The President's budget supports DOE's energy frontier research centers which are working to solve specific scientific problems to help unleash new, clean energy technology development and our energy innovation hubs which bring together our Nation's top scientists and engineers to achieve game changing energy goals.

The fiscal 2014 request also includes $379 million for the advanced research projects agencies for energy to support high impact energy related research projects with a potential to transform the energy sector.

In addition to strengthening our economy the budget request also strengthens our security by providing $11.7 billion for the Department's National Nuclear Security Administration. NNSA plays a vital role in achieving President Obama's nuclear security objectives including in the prevention of nuclear terrorism and the great and urgent threat it presents to our Nation and to the world.

Finally, the President's budget request of $5.6 billion provides the resources to clean up the cold war legacy and continue the world's largest environmental remediation effort led by the Office of Environmental Management.

Given the urgency of the challenges we face and the current fiscal climate DOE remains committed to streamlining our organization to improve performance and save taxpayer money. The Department has already achieved approximately $322 million in strategic sourcing savings including reducing our vehicle fleet by 8 percent.

The President's fiscal year 2014 budget request for the Energy Department protects Americans from nuclear hazards. It advances basic science and cutting edge research to strengthen America's future competitiveness and helps make America a magnet for jobs again by investing in high tech manufacturing and innovation, clean energy and infrastructure. The budget does all these things as part of a comprehensive plan that reduces the deficit and puts the Nation on a sound fiscal course.

Thank you. I am now very pleased to answer your questions.

[The prepared statement of Mr. Poneman follows:]

PREPARED STATEMENT OF DANIEL B. PONEMAN, DEPUTY SECRETARY, DEPARTMENT OF ENERGY

Chairman Wyden, Ranking Member Murkowski, and Members of the Committee, thank you for the opportunity to appear before you today to discuss the President's fiscal year 2014 Budget request for the Department of Energy.

The United States is on the path to a cleaner and more secure energy future. Since President Obama took office, responsible oil and gas production has increased each year, while oil imports have fallen to a 20 year low; renewable electricity generation from wind, solar, and geothermal sources has doubled; and the carbon emissions that threaten our planet have fallen to the lowest level in the U.S. in nearly two decades. In short, the President's approach is working. It is a winning strategy for the economy, energy security, and the environment.

But even with this progress, there is more work to do. High gas prices impact American families and businesses every day, and remind us that we are still too reliant on oil, which comes at a cost to American families and businesses. While there is no silver bullet to address rising gas prices in the short term, President Obama remains committed to a sustained, all-of-the-above energy strategy and common-sense proposals that will further reduce our dependence on oil, better protect consumers from spikes in gas prices, and reduce pollution.

The Energy Department plays a vital leadership role in continuing the significant progress America has made in producing more American energy, creating the clean energy jobs of the future, and making energy more efficient across the economy.

In total, the President's 2014 Budget provides $28.4 billion in discretionary funds for DOE to support its mission. The FY 2014 Request supports the President's goal to increase American competitiveness and reduce our reliance on oil by making strategic investments in critical research and technology sectors for clean energy and to make significant national security advances to leave future generations with a country that is safer, healthier, and more prosperous. Further, the President proposes investments so the United States will lead the world in development, demonstration, and deployment of clean energy technologies, to reduce our dependence on oil and to mitigate the impact of climate change. The Request also includes increased funding to modernize the Nation's nuclear deterrents and continue securing vulnerable materials around the world. In light of the current discretionary spending caps, these increases in funding are a testament to the importance of clean energy and innovation to the country's economic future and the importance of nuclear security to the Nation's safety.

Investing in clean energy, innovation, jobs of the future

As part of the Administration's all-of-the-above energy strategy, the President's budget request invests in programs that support research and deployment of the energy technologies of the future. These investments will help us double American energy productivity by 2030, save consumers and businesses money by saving energy, and support groundbreaking research and innovation to leverage every domestic source of energy, from natural gas and nuclear to solar and wind.

The budget request invests approximately $4.7 billion in applied energy programs. This is a 42 percent increase over FY12 enacted levels and demonstrates the President's commitment to making America a magnet for clean energy jobs, ensuring our nation's energy security, and combating climate change.

The Request includes $2.8 billion in funding for programs designed to help meet the President's goals of investing in the next generation of renewable energy technologies, advanced vehicles and fuels, and energy efficiency measures that reduce energy use in Federal agencies and the industrial and building sectors.

The budget continues to support the Department's successful SunShot initiative, which aims to make solar energy cost-competitive with conventional sources of electrical energy, without subsidy, by the end of the decade. It also supports several other cross-cutting initiatives including the following:

- EV Everywhere Grand Challenge—advances the goal of making the U.S. the first country in the world to invent and produce plug-in electric vehicles that are as affordable and convenient as gasoline powered vehicles by 2022.
- Clean Energy Manufacturing Initiative—focuses on dramatically improving U.S. competitiveness in the manufacturing of clean energy products and strengthening U.S. competitiveness across multiple manufacturing industries through increased energy productivity.

- Grid Integration Initiative—develops the technologies, tools, and approaches to overcome grid integration barriers for renewable energy, electric vehicles, and energyefficient building technologies while maintaining grid reliability.

In addition to the Grid Integration Initiative, the budget request includes $169 million to facilitate grid modernization and increase the reliability and security of the grid. In FY14, we are 3 undertaking efforts to produce real-time analysis of the transmission system and energy supply disruptions, improve response times during emergencies, and promote effective cyber-security capabilities in the energy sector.

Investing in energy efficiency and renewable energy generation are fundamental steps necessary for creating a clean energy economy. The Administration continues to call on Congress to pass HomeStar or similar mandatory funding legislation aimed at creating jobs and spurring economic growth by encouraging Americans to invest in energy-saving home improvements.

Currently, nuclear energy supplies approximately 20 percent of the Nation's electricity and over 60 percent of clean, non-carbon producing electricity. Over 100 nuclear power plants are offering reliable and affordable baseload electricity in the United States, and they are doing so without air pollution and greenhouse gas emissions. The budget request invests $735 million in the nuclear energy program to help develop the next-generation of nuclear power technologies, including small modular reactors and improved light water reactor systems, and continue R&D efforts in areas such as improved fuel forms. The Budget also provides $60 million to support the Administration's Strategy for the Management and Disposal of Used Nuclear Fuel and High Level Radioactive Waste, which provides a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing and disposing of used nuclear fuel and high-level radioactive waste.

As we move to a sustainable energy future, America's fossil energy resources will continue to play an important role in our energy mix. President Obama is committed to developing our oil and gas resources in a safe and sustainable manner. Today, America produces more natural gas than ever before—and nearly everyone's energy bill is lower because of it. The Administration's Budget Request includes $638 million to advance technologies related to the reliable, efficient, affordable, and environmentally-sound use of fossil fuels, and provide strategic and economic security against disruptions in U.S. oil supplies. Key R&D efforts include developing costeffective carbon capture and storage and advanced power systems. The Budget also invests $2 billion over the next ten years from Federal oil and gas development revenue in a new Energy Security Trust that would provide a reliable stream of mandatory funding for R&D on costeffective transportation alternatives that reduce our dependence on oil.

As industry, Congress, and the American people make critical energy decisions that require an in-depth understanding of domestic and international energy markets, it's important that we adequately fund the Energy Information Administration, the nation's premier source of independent statistical information about energy production and use. That is why the budget request includes $117 million for EIA.

Investing in Science and Innovation to Keep America Competitive

Competing in the new energy economy will require us to harness the expertise of our scientists, engineers, and entrepreneurs. As the President said, the "the world is shifting to an innovation 4 economy, and nobody does innovation better than America. In today's innovation economy, we need a world-class commitment to science and research." The President is committed to making investments in research and development (R&D) that will grow our economy and enable America to remain competitive. This focus on science and innovation will help create the industries and jobs of the future and address the challenges and opportunities of the 21st Century.

The Administration recognizes the Government's role in fostering scientific and technological breakthroughs, and has committed significant resources to ensure America leads the world in the innovations of the future. This includes $5.2 billion for the Office of Science to support basic research that could lead to new discoveries and help solve our energy challenges. These funds support progress in materials science, basic energy science, advanced computing and more. They also provide America's researchers and industries with state-of-the-art tools to ensure they stay at the cutting edge of science.

The budget request continues to support Energy Frontier Research Centers. The Energy Frontier Research Centers are working to solve specific scientific problems to help unleash new clean energy technology development. So far, the EFRCs have generated some 3,400 peer-reviewed papers 60 invention disclosures, and 200 patents, and the Centers report numerous instances of technology transfer. In their

three-plus years of existence, the EFRCs have achieved scientific breakthroughs in multiple areas, from solar power and batteries to new catalysts for refining petroleum and powering fuel cells. In FY 2014, we are going to hold an open re-competition to select new EFRCs and consider renewal applications for existing EFRCs.

The budget request also supports the five existing Energy Innovation Hubs and proposes a new Hub in electricity systems. Through the Hubs, we are bringing together our nation's top scientists and engineers to achieve game-changing energy goals. The Hubs continue to make progress. For example, the Modeling and Simulation for Nuclear Reactors Hub has released the first versions of software that, support simulating a virtual model of an operating physical reactor. The Fuels from Sunlight Hub has filed multiple invention disclosures and published scientific papers. And the Energy Efficient Buildings Hub is developing advanced building modeling tools and has built one of the country's first 3-D building design labs.

Additionally, the budget request includes $379 million for the Advanced Research Projects Agency for Energy, known as ARPA-E, to support high-impact energy-related research projects with the potential to transform the energy sector. ARPA-E has invested in roughly 285 high-risk, high-reward research projects that, if successful, could create the foundation for entirely new industries. 17 of these projects, which received an initial investment from ARPA-E of approximately $70 million in total, have attracted over $450 million in private sector follow-on funding. These companies and research teams have produced a battery that doubled the energy density of any previous design, successfully engineered microbes that use carbon dioxide and hydrogen to make fuel for cars, and developed a 1 megawatt silicon carbide transistor the size of a fingernail.

In FY14, ARPA-E will continue to work on all aspects of transportation, including alternative and bio-derived fuels, batteries, components for transportation electrification, and advanced vehicle designs and materials. Additionally, ARPA-E will continue to work on all aspects of stationary power systems, including building efficiency, stationary energy storage systems, grid modernization, and stationary energy generation.

Taken together, our research initiatives will help power America's great innovation machine to accelerate energy breakthroughs and create jobs.

Nuclear Safety and Security

In addition to strengthening our economy, the budget request also strengthens our security by providing $11.7 billion for the Department's National Nuclear Security Administration. NNSA plays a vital role in achieving President Obama's nuclear security objectives.

As the United States begins the nuclear arms reduction required by the New START treaty, the science, technology and engineering capabilities within the nuclear security enterprise will become even more important to sustaining the U.S. nuclear deterrent. The budget request includes $7.9 billion for Weapons Activities, a nine percent increase over the FY 2012 enacted levels. This increase provides a strong basis for transitioning to a smaller yet still safe, secure and effective nuclear stockpile. It also strengthens the science, technology and engineering base of our enterprise.

The budget request also includes $1.2 billion for the Naval Reactors program to ensure the safe and reliable operation of reactors in nuclear-powered submarines and aircraft carriers and to fulfill the Navy's requirements for new nuclear propulsion plants that meet current and future national defense requirements.

Additionally, the budget request supports NNSA's critical work to prevent nuclear terrorism—one of the most immediate and extreme threats to global security. That is why President Obama has elevated this challenge to the top of our national security goals. It includes $2.1 billion to implement key nuclear security, nonproliferation and arms control activities. It supports efforts to detect, secure, and dispose of dangerous nuclear and radiological material around the world. And it will help the Department to fulfill its role in completing the President's four-year plan to secure all vulnerable nuclear materials worldwide.

Finally, the President's FY2014 Budget Request of $5.622 billion provides the resources to clean up the Cold War legacy and maintain momentum in the world's largest environmental remediation effort, led by the Office of Environmental Management (EM). EM continues to develop and apply innovative environmental cleanup strategies and construct and operate one-ofa- kind, highly-complex facilities to safely complete clean-up in a manner that demonstrates continued value to the American taxpayers.

Investing for Security and Prosperity

The President's fiscal year 2014 Budget Request for the Energy Department protects Americans from nuclear hazards, advances basic science and cutting-edge research to strengthen America's future competitiveness, and helps make America a magnet for jobs again by investing in hightech manufacturing and innovation, clean energy, and infrastructure. The Budget does all of these things as part of a comprehensive plan that reduces the deficit and puts the Nation on a sound fiscal course.

As President Obama has said, "Today, no area holds more promise than our investments in American energy. After years of talking about it, we're finally poised to control our own energy future." The investments included in the Administration's Energy Department budget request are vital to ensuring America's energy security and securing America's place as the world leader in the clean energy economy.

Thank you, and now I am pleased to answer your questions.

The CHAIRMAN. Thank you, Secretary Poneman.

Let me turn first to the question of fracking. In the last few years the country has seen record highs in production of natural gas and production of natural gas liquids and crude oil production is headed back to levels not seen since the 1980s. I think it's understood that much of this growth is driven by shale development and with that, fracking.

We also know that while this has certainly been a big plus for our economy, it benefits our country in a whole host of ways. I was recently at a school in Central Oregon where we were looking at 35 percent reductions in natural gas pricing. So it's very clear that benefits are being felt throughout so many communities.

Valid concerns, valid concerns, have been raised as to how safely this continued development can be done. These environmental issues, in my view, have got to be addressed. They've got to be addressed right.

So I look at the budget and I'm trying to sort through the justification for the Department of Energy cutting the fossil energy research budget by 15 percent. The budget provides 12 million toward research on natural gas technologies. This is in collaboration with, of course, the Environmental Protection Agency and the Department of the Interior.

DOE's role or core competency in this effort is intended to be well integrity and green technologies. Certainly 2 of the most important components in ensuring future shale development is done in an environmentally sound way. It just seems to me that when you really sort through, Senator Murkowski and I have both said, what our priorities are, what's most important? Any investment in research in this area would be returned many times over in savings that would be accrued in environmental cleanup and revenue from further development.

So there's a lot on the line. It's hard to look at the size of the stakes and then see this really, very modest, disproportionately small effort put into research. So what's your take with respect to that concern?

Mr. PONEMAN. Thank you, Mr. Chairman.

First of all I would like to strongly agree with both of the premises of your question which is that the prodigious increase in natural gas has been a game changer for this country. Actually the dollars that went into that produced increase are very, very modest. So one point is that you can get big bang for the buck sometimes with a very modest investment.

We've put $137 million into hydraulic fracturing research and horizontal drilling research between 1978 and 1992 in the department. From that we've gone from 2 percent to 35 percent natural gas. So that's the first part.

The second premise we agree with is if we do not take care to ensure that we do this technologically well and responsibly. Not only responsibly but in a way that's transparent to the taxpayers and to the people of this country, we will not be able to continue to enjoy the incredible benefits this provides. So we therefore agree on the need to make sure we get that part right as well.

We are investing in the R and D where it's helpful. There is leverage, Mr. Chairman, in the fact that we're not doing this alone. I think you know we have now signed an MOU with the EPA and with the Department of the Interior, who each of whom bring relevant expertise to some of the environmental issues related to fracking.

We have put in this budget $25 million prize for who can come up with good ideas on how to introduce capture technology on natural gas fired plants. We're always making, as you well know, and with your assistance, hard decisions on exactly where the dollars go. But I want to assure you that the dollars that we have dedicated to this technology, we believe, are the right dollars to promote both of the premises of your question.

The CHAIRMAN. I think you're making important points. I think you're playing a bad hand here when the budget cuts 15 percent in a critically important area.

I just want to make one other point very quickly. If you all don't do this research, I don't think it's going to get done. I mean, for example, Senator Murkowski and I are going to start natural gas workshops next month. We intend to work very closely with the Administration. It's going to be a completely bipartisan effort.

One of the areas we're going to be looking at is best practices on our public lands. I'm concerned that the research that you all do is not going to be as extensive as it might be with a more fulsome budget in this area. We'll look directly into this during the workshop Senator Murkowski and I have planned.

So I hope that you will take this back. Certainly I want you to know I'm going to do everything I can as chairman of this committee, and also as member of the Budget Committee, to turn that around.

I'm going to just mention one other point because my time has expired.

We like to say up here that we're concerned about the forgotten renewables. When I went to Alaska with Senator Murkowski, we looked at geothermal and biomass and hydropower. Research into hydropower in the budget is cut. Given the estimates of untapped potential in hydropower resources, upwards of 60 gigawatts of emissions-free generating capacity, I am very troubled about that as well.

I'm over my time and want to recognize Senator Murkowski and Senator Barrasso. But just know how strongly we feel about these research cuts. In my view, if you all don't do it, it isn't going to get done. We're going to lose the opportunity to get returns that will be many times over the cost of any initial research.

Senator Murkowski.

Senator MURKOWSKI. I want to add a me too, on the hydro. You know, we heard very, very clearly from Secretary Chu. This was several years ago that the potential for additional renewable energy, any power brought online because of hydropower it's just so untapped. Yet when we look at the budgets it just doesn't appear to reflect any of that.

With the cuts to the water power program, as I mentioned in my opening statements and as the chairman has just noted, you've got a request of $55 million for the water power program.

You compare this to $356.5 million for solar.

One hundred fourty-four million for wind.

Yet the area where everyone agrees we have so much potential for growth is hydro. We're looking at a request of $55 million.

I think you've heard the concerns expressed here by the chairman and myself. So I don't know. We will keep pushing on this. In fact we've got a hearing, Mr. Chairman.

The CHAIRMAN. Right.

Senator MURKOWSKI. I think next week.

The CHAIRMAN. Yes.

Senator MURKOWSKI. On how we can move out hydropower.

The House in an amazing display of partisanship passed their hydro bill with not one member in opposition to it. We want to advance something on this side too. We think this is an opportunity where the President can actually sign something into law.

But it doesn't seem that there's the level of priority coming out of the Administration on this.

How much is the Department proposing should go for marine hydrokinetic technologies and how much for conventional hydropower research? Do you know that break down?

Mr. PONEMAN. I can get it for you very quickly.

Senator MURKOWSKI. Would you?

Mr. PONEMAN. Yes, Senator.

Senator MURKOWSKI. OK. Because I'm curious in knowing what types of programs and projects DOE is going to focus on within this water power program. So if you can get me that break down I'd appreciate it.

Mr. PONEMAN. Absolutely.

Senator MURKOWSKI. Now the chairman has also been talking about the great potential that we have for natural gas. The focus this committee is going to place on all aspects of natural gas sector here through our round tables coming up. We've had a lot of discussion in this committee about exports. We've got pending before the Department currently, we've got 20 applications for licenses to export LNG. The bulk of these applications are to send LNG to countries that don't have a free trade agreement.

From a budget perspective are you all including funding levels sufficient to ensure the timely review of these applications? I guess I'm asking also for the timeline, if you have that, for review of these applications.

Mr. PONEMAN. Thank you, Senator.

If I might just quickly address the first part of your question. We do strongly agree on the importance of hydro. Obviously I would

note that the $55 million that you've noted for fiscal 2014 is actually an increase from $20 million in 2013.

Senator MURKOWSKI. But it still looks pretty meager when you compare it to wind and solar.

Mr. PONEMAN. I certainly take your point, Senator. The break down between marine hydrokinetic is 39 million. Traditional hydro is 15 million in the current fiscal 2014 request of the 55.

On your second question regarding the LNG exports. We do believe the Department is adequately staffed to process those. As you know, we've gotten almost 200,000 comments in this 2 round comment process that we've had. They've been working very actively on sorting through those comments. I think we're, very soon, going to be in a position to start making decisions based on the record all the documents that have been supplied.

Senator MURKOWSKI. So when you say very soon within a period of months? What do you anticipate?

Mr. PONEMAN. Senator, they're working through them as quickly as they responsibly can. I don't have a date certain. I wouldn't think it would be months.

Senator MURKOWSKI. OK.

One more question for you. I raised this in my opening statement. This is relating to where the President is referring to as his energy security trust. As I mentioned I've had a proposal out there that we're calling the Advanced Energy Trust Fund, same type of concept, but the real key difference is how you pay for it.

Can you explain exactly how the Administration intends to pay for its proposal? If you're not opening up any new lands for development are you proposing deficit spending? Will there be less money for land water conservation fund? Where do you figure you're going to get this seed money for the energy security trust?

Mr. PONEMAN. Senator, my understanding was that the money, the $2 billion for that energy security trust, would come out of the royalty revenues from the Federal lands that are used to develop those resources.

Senator MURKOWSKI. But those revenues are already going to help fund other aspects of our budget. So you're then taking them away from those projects and programs and you're putting them into your trust fund. I got that.

But then how do you fund the other things you've been paying for out of your rents and royalties?

Mr. PONEMAN. Senator, my understanding and of course the licensing of those Federal lands falls under the jurisdiction of the Department of the Interior, was that there are licenses that will be granted that will generate these royalties. But to give you a specific breakdown and if there are puts and takes between existing and new licenses I would have to get back to you.

Senator MURKOWSKI. I'd like to see exactly how that's proposed.

Mr. PONEMAN. I'm happy to provide that.

Senator MURKOWSKI. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Going back and forth, Senator Heinrich, you're next.

Senator HEINRICH. Thank you very much.

Thanks for joining us, Mr. Poneman. Let's get right to it because I've got a lot of questions.

I want to start with a question about the Department's strategy to manage nuclear waste and the importance that I raised last week of maintaining a clear linkage between the siting of short term storage facilities and the development of a permanent or several, potentially, permanent geologic repositories. It's this linkage throughout the process that will keep the pressure on the Federal Government to actually build a repository. Dr. Moniz said here last week that the Blue Ribbon Commission agreed that there should be a linkage and that the development of the 2 facilities should proceed in parallel.

So everybody seems to agree that there should be some sort of linkage here. But I've yet to hear any discussion of exactly what that linkage should be or should look like. I note that the Department's own strategy calls for an interim storage facility to be in operation by 2021, but not to open a permanent repository until 2048. That is 27 years later. That, to me, doesn't sound like a very close linkage.

The history of nuclear waste in this country shows that a lot can go awry in 27 years. I believe a process without some sort of linkage is going to be a mistake. The Department is on record supporting the linkage. The BRC supports a linkage.

Do you agree that a nearly 3 decade gap, you know, barely constitutes a linkage? Can you tell me what the Department thinks that an appropriate linkage would look like or should be?

Mr. PONEMAN. Senator, thank you for the question.

The, I think, both the Blue Ribbon Commission, sir and the Administration's response to it clearly acknowledge the importance of that. When, for example the Blue Ribbon Commission said although the geologic repository would come later, the work on it needs to begin today. So we're not deferring the work on the geologic repository. There's, of course, more technical challenge involved in certifying it and getting the research done on the geologic formation and how they'll perform for millions of years as opposed to a simple above ground cask storage that is possible with interim storage.

But I would just say, Senator, that the way we see the linkage is two-fold.

No. 1, we are, quite literally, doing the research on both sides. We're not saying we're only working on interim storage now and we'll get to the other later. We're saying we've got to start both now. That's consistent with the Blue Ribbon Commission recommendation.

The second thing is to be very, very clear in the reference to consent based approvals and that, I think, is one of the major contributions of the Blue Ribbon Commission, that when you are talking to communities you need to be very clear about what they are in for and you can't shift the story line and say I was just kidding when I said interim. So when we say interim, we mean interim.

Senator HEINRICH. I think that second point is incredibly important because you're never going to get a community to consent or especially at the State level, you're never going to get the buy in

you need for interim storage if people think they're going to get stuck with that interim storage.

Mr. PONEMAN. Exactly.

Senator HEINRICH. It's going to turn into de facto permanent storage.

I want to move to LANL cleanup real quick. The FY2013 continuing resolution does not provide the Administration's request for an additional 50 million Los Alamos needs to meet some pretty critical milestones and for that matter consent orders with the State of New Mexico for cleanup of legacy nuclear waste. I want to ask will the Department be requesting a reprogramming to provide additional funding for Los Alamos to keep that cleanup on schedule and meeting the milestones within those consent orders that have been agreed to between the State and the Department?

Mr. PONEMAN. Two points, Senator.

First of all, we are firmly committed to meeting our objectives and requirements under the consent decree. We, as you know, in the fiscal 2014 budget are requesting an additional $46 million for LANL cleanup. We are in the process of finalizing with the amounts we have requested for 2013 not having come through between the continuing resolution and the sequester, a series of reprogrammings which we're going to use to address these outstanding issues in our environmental portfolio.

Senator HEINRICH. I look forward to working with you on that. Please keep us apprised.

Mr. PONEMAN. We sure will.

Senator HEINRICH. Because that's a critical step forward in terms of us meeting our commitments and continuing to, you know, make sure that we have the confidence of those communities that we're going to do what we say we're going to do.

With that it looks like my time is expired.

I do want to say real quickly that I think it's a mistake to shut down the fusion center at MIT. I look forward to working with the chairman to make sure that we have the right balance there between our partnerships overseas and our domestic efforts.

The CHAIRMAN. Important point.

Senator Barrasso, you're next.

Senator BARRASSO. Thank you very much, Mr. Chairman.

Mr. Secretary, thanks for being with us.

I'd like to ask you about liquefied natural gas exports. On April third, Bloomberg ran a story entitled, "Canada seen beating U.S. in $150 billion Asia LNG race." The article* explains that Canada has approved twice as much LNG export capacity as the United States. It explains that Canada issued its latest export permit in February while the DOE has continued to delay taking action on the pending permits for almost 2 years now.

DOE commissioned a comprehensive study which found that LNG exports would bring, "economic benefits" to the United States. DOE has now received 2 rounds of public comments on this study. Yet the DOE continues to delay taking action on any of the pending export applications of which I know one of which has been pending for 28 months.

* See Appendix II

Investors are beginning to interpret DOE's inaction as a decision against LNG exports. I think this is a terrible precedent to set. It's going to signal to the world the United States isn't serious about increasing its exports and the good paying jobs that those exports were going to create right here.

It is going to signal to export opponents that they can block exports so long as they just delay the approval process. So I think it's going also signal to our trading partners that the United States doesn't really believe in free trade. So my question is do you appreciate the negative impacts of the Department's failure to take actions on the pending LNG export applications?

Mr. PONEMAN. Senator, thank you for the question. It is obviously something that's very important. I know people have been working very hard to process the comments. We want to make sure that we are addressing this expeditiously. But the issues that have been raised in nearly 200 thousand comments are complex.

I will tell you, Senator, we are working on this very hard. We are clearly aware of the benefits that exports can bring. But according to the criteria that's been laid out since 1984, we have to take into account domestic affects and a full range of those issues that would feed into the public interest determination that the Natural Gas Act requires. But we are keenly aware of the need to be acting. We are working on it very hard.

Senator BARRASSO. Thank you, Mr. Chairman.

I'd also like to ask about the Department's new uranium management plan. The consolidated appropriations act for fiscal year 2012 says that no later than June 30th of 2012 of last year, the Secretary shall submit to Congress a revised excess uranium inventory management plan for fiscal years 2013 through 2018. So now we're 9 and a half months after the deadline and over 6 and a half months into this fiscal year. But DOE still hasn't produced a plan.

I think this is inexcusable. The Department has repeatedly broken its commitments under the 2008, what was called the excess uranium inventory management plan. Now it refuses to follow the law and release the revised management plan. The Department's failure to disclose how it will manage its uranium stockpile, I mean, it threatens uranium mining projects, good paying jobs, certainly in my home State of Wyoming and other States as well.

When will the Department release a revised excess uranium management plan? Do you have any idea when that's going to be?

Mr. PONEMAN. Senator, first let me again, agree with the premise of your question which is to acknowledge the importance of the domestic uranium industry to, not only our energy future, but our national security future. I regret that it has taken longer than it should have. I take the admonition from the chairman and ranking member from the opening.

We always try to do better. I will undertake, Senator, to go back to the department, get a timeline and come back to you with it.

Senator BARRASSO. I'd appreciate it. I mean, I'd like to find out what the reason is for the delay and I know you can't do that now. But I'd like to get that.

Senator BARRASSO. Another thing I'd like to ask about is duplicative programs. Last week the Government Accountability Office re-

leased its 2013 annual report, entitled, "Actions Needed to Reduce Fragmentation, Overlap and Duplication."

In that report the GAO identified 679 renewable energy initiatives at 23 different Federal agencies.

Found that 9 agencies implemented 82 different wind energy initiatives costing taxpayers about $4 billion in fiscal year 2011.

They found 7 initiatives provided duplicative financial support to the same recipient for a single project.

That 2 wind projects may not have needed the Federal Government's support at all.

So in light of this study and the duplication is it appropriate to ask for such dramatic increases in funding for the renewable energy programs?

Mr. PONEMAN. I think there are a couple of things, Senator.

First of all, where we actually can find duplication and things that are being done twice, that's not efficient. We should find those and root them out.

That having been said, you know, if you look at the investments that have been made in this portfolio they have actually returned their investment many times over. I think we've put $2 billion of R and D funding into wind. We've got a $9 billion return on that.

You know, we are now at a point where last year alone we put 14 gigawatts of new wind online. We're up to 60 gigawatts. We're moving in a number of these directions.

But we live by a management principle that continues improvement. If we ever do find duplication we will root it out.

One last thing with that's why we have actually inserted cross cutting initiatives such as our clean energy manufacturing initiative precisely to see if something is happening in science and something is happening in applied energy that they be brought into the same coherent approach, not duplicative.

Senator BARRASSO. Thank you, Mr. Secretary.

I'm going to submit, Mr. Chairman, with your permission, additional written questions.

The CHAIRMAN. Without objection.

The CHAIRMAN. I just want to say to my friend from Wyoming, it's my intent to work very closely with you and all our colleagues on both sides of the aisle on this natural gas export issue.

I chair the Finance Subcommittee on International Trade. I've voted for every market opening trade agreement since I've been in the Congress. Trying to find a way perhaps where we can have it all, where we can strengthen manufacturing, have exports, have a segway to a broader role for renewables.

Easier said than done, but it's my intention to work very closely with my friend from Wyoming. I know you have strong views on it. All 3 of us are Westerners, so I think there's an opportunity to find some common ground.

Our next Senator is Senator Coons.

Senator COONS. Thank you, chairman. There's even some Easterners who might support working together on this all of the above strategy.

The CHAIRMAN. Easterners on the program.

Senator COONS. Deputy Secretary Poneman, I just wanted to start by thanking you and so many others within the Department,

employees, contractors, for the tremendous job you've done over the last few years, especially as it applies to DOE's core energy mission. The news of DOE's work has, at times, focused on a few negatives. When I think there have been broadly many successes.

I really enjoyed working with Secretary Chu. Look forward to serving with Dr. Moniz. I think you've made tremendous accomplishments. In particular I was pleased to see in the budget the extension, the continuation, of ARPA–E which I think has yielded great benefits, actual concrete outcomes for the people of the United States.

I intend to work with Senator Alexander on a reauthorization of the DOE COMPETES programs in science and ARPA-E and will work with the other committees that are relevant to that reauthorization to help get them through Congress. I Was pleased with the support you've shown and the President's budget has shown in delivering on ARPA-E as well as energy hubs and EFRCs; doubling the production of wind and solar; So many other areas from technical assistance during tragic disasters like Deep Water Horizon, and the Fukushima and Hurricane Sandy disasters to nuclear site cleanup progress that's been discussed previously, so I just wanted to start by saying thank you to you and so many in the Department.

There's many things I'd love to discuss that come out of the budget. I was pleased that Senator Murkowski earlier in this hearing referenced something that I think holds real promise for a bipartisan path forward, master limited partnerships, as a vehicle for an all of the above financing strategy. I understand Dr. Moniz, had positive comments to make about MLPs and REITs during his confirmation hearing. I look forward to continuing to work to advance these ideas. We've been grateful for the technical assistance we've received from the Department while preparing the bill.

I also was encouraged by the race to the top for energy efficiency and grid modernization proposal, as well as the manufacturing initiative and involving development of innovation institutes.

So for my first question I'd be interested in what more you can tell us about the schedule for announcement and focus areas for the DOE specific regional innovation institute that's directly related to manufacturing.

Mr. PONEMAN. Thank you very much, Senator. Thank you for the kind words. I would like to thank you and the members of this committee for long standing support for many of the initiatives which would not have gotten anywhere that they have gotten without the incredible work of the members of this committee, hubs and ARPA-E and the rest.

Secondly commend you all for your thought leadership on master limited partnership. The whole issue of lowering capital costs for our energy resources is obviously going to be increasingly important. We are always very eager to work with you on that.

Now in terms of the innovation institutes we are in the process of building on work that we have already done in consultation with the Commerce Department, with the Department of Defense, with National Science Foundation and NASA in figuring out exactly where the best play is going to be for the DOE specific institute,

innovation institute. We're not done with that work. It's still under review.

We're looking at a wide range of options and we are open to soliciting views on where the most effective play can be because, as you know, they're, as you know, going to be a series of these institutes. We want to make sure that per the other questions, we are not duplicating among the different institutes. DOD is doing 2. We're doing 1. We will keep you fully and currently apprised of the selection of which technologies we're going to focus on.

Senator COONS. Terrific. Thank you.

One other question, if I might. The Energy Security Trust Fund is of particular interest to me as well. I think Chairman Wyden has led early positive, constructive conversations within this committee about how we might use a comparable vehicle or this vehicle for sustained funding and financing for the development of promising technologies.

How does the Administration view this initiative? Could you tell us a little bit more about how you anticipate it being structured and operated?

Mr. PONEMAN. It comes out of the mandatory appropriations. We hope to turn the revenues that we generate or by the royalties on federally owned lands for oil and gas production to those things that can help fulfill the President's vision to reduce our dependence on oil imports still further. So I think you can look in areas such as electrical vehicles, batteries, biofuel development.

We will be looking to make investments out of that trust fund to then help us move further along the line which we've already reduced our foreign oil imports from 57 percent in 2008 to 42 percent. We view this trust fund as a way to further build an American transportation fleet that is energy secure for Americans.

Senator COONS. That's terrific. I very much appreciate your answer. I look forward to working with you as the details of that are further refined.

Mr. PONEMAN. Thank you, Senator.

Senator COONS. Thank you very much, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Coons.

Let me also say that I too feel that you're making a very important contribution in a number of areas and especially this master limited partnership issue. Because this is a chance to really generate a significant amount of new private sector investment in renewables. That would make a huge contribution to what we heard Dr. Moniz talking about even last week. That is how do we transition to a lower carbon economy.

So I'm going to work very closely with you on that.

Senator Franken.

Senator FRANKEN. Thank you, Mr. Chairman.

It's good to see you, Mr. Deputy Secretary. Thank you for coming to Minnesota a while back. It was good to spend time with you there.

I want to talk about nuclear weapons spending. Nuclear weapons are weapons that we're never going to use. We do need a safe, secure and reliable nuclear deterrent so that we don't have to use them, I mean. The Department has an important role in making sure that we have that.

But we are continuing to spend so much money on weapons activities in the nuclear, National Nuclear Security Administration with a budget request of $7.9 billion for this year. That is money that, if we really move forward on further nuclear reductions we could spend on other priorities including other defense priorities or infrastructure priorities.

Can you tell me where the Administration is in its review of our nuclear doctrine which will help determine the number of nuclear weapons we really need to maintain that deterrent?

Mr. PONEMAN. Senator, thank you for the question.

As you know President Obama in Prague in April 2009 laid out a comprehensive vision of our nuclear future. Actually articulated a vision of a world potentially without nuclear weapons, but at the same time he said so long as we have them and that we and our allies depend on them for the deterrent, we do need to make sure that it's safe, secure and effective.

There is a nuclear posture review that's already governing our nuclear posture. It has, for the first time in any such review, elevated the fighting of nuclear terrorism and combating proliferation to the very top rank issue of why we have these nuclear weapons. So the investments you see also include a $2.1 billion on all the non-proliferation activities.

We are continuously reviewing in consultation with our colleagues at the White House and in the Department of Defense what the actual employment doctrine will be for these weapons to make sure we keep it currently updated. That is a process that has been going on since sometime last year. We're still in the process of continuing that review.

Senator FRANKEN. How exactly does our deterrent effect nuclear terrorism?

Mr. PONEMAN. Senator, we think of our National Nuclear Security Administration as a national security enterprise in which we are investing in both things like second line of defense, mega ports. Those are directly in the line of stopping nuclear materials and technologies from reaching bad guys and terrorists.

In addition to maintain a robust deterrent holds at bay other potential would be parties who would be tempted, potentially, to develop their own nuclear arsenal, but for the fact that the United States has a robust deterrent.

Senator FRANKEN. OK.

Mr. Poneman, when you announced dismantlement of the last B53 nuclear bomb you said that this is an accomplishment that, "Has made the world safer and for which everyone involved should be proud." I agree with that sentiment.

You went on to say that, "Safely and securely dismantling surplus weapons is a critical step along the road to achieving President Obama's vision of a world without nuclear weapons."

But when I look at your budget when I see that while a billion dollars is devoted to the lifetime extension program for these weapons only $49 millions is going to the dismantlement program and that is in spite of the fact that dismantlement isn't expected to be completed until 2022. Can you tell me why you're only budgeting $49 million a year for implementing what you call, "A critical step

along the road to achieving President Obama's vision of a world without nuclear weapons."

Mr. PONEMAN. Senator, I think it's important to put that particular effort in the wider context of dismantling nuclear weapons so that they cannot be used to—in weapons form any longer. In that respect with Department of Energy leadership we agreed to purchase 500 metric tons of highly enriched uranium from Russia. Through that process we got half of the fuel going to our civilian nuclear reactors in this country, about 20,000 nuclear weapons worth.

So if you put the $49 million which is one piece of it in the broader context, I think this Nation collectively has invested enormous resources and gotten enormous benefits out of the dismantlement of weapons of mass destruction. To be candid, the ones that are of greatest concern to us from a national security perspective are those that used to be in war heads in the former Soviet Union pointed at us. We are always looking to match up, Senator, the sequencing of the dismantlement with the processing of the fuels that are coming out of the dismantlement process.

Some of these issues, as you know for budgetary reasons, not withstanding our request but the curtailment under the continuing resolution, have been pushed to the right. So I'd have to look at the specifics of the 49 million per se, but I think it has to be viewed in that context. But it does not, in any way, diminish our overall commitment to going around the world through the global threat reduction initiative getting the material out of HU form where we find it in Chile and other places and bringing it back to a safe place so that it can't be used by nuclear terrorists.

Senator FRANKEN. Thank you. I'm out of time. I would like to say that I told Senator Lugar that I felt he was a hero for what Nunn-Lugar started. I thank you for continuing that.

Mr. Chairman.

The CHAIRMAN. Thank you, Senator Franken.

You know the striking point you're making is if you spend, in a focused way on dismantling nuclear weapons, particularly the unnecessary weapons, you won't have to spend as much on maintaining the strategic stockpile. So you're being logical. Heaven forbid that logic breaks out all over Washington.

But I was looking at that $7.9 billion and if you say, alright, there's a way to focus on dismantling unnecessary weapons, you're doing something about lowering those costs. It makes sense to me.

Senator FRANKEN. Thank you for taking my point.

The CHAIRMAN. We don't have colleagues on either side who haven't had a chance yet. So what I think we'll do is begin a second round and figure out how to integrate colleagues who haven't had their first round into this.

Let me turn to the question of nuclear energy, Secretary Poneman. Senator Murkowski and I have both been to Fukushima. It was important to see the situation first-hand given how many nuclear plants operate in our country and around the world.

I start with a proposition. No matter how a United States Senator feels about nuclear power-and obviously there are disparate views here-nuclear energy, as of today, provides a substantial portion of base load electric energy here and abroad. As we have

looked at Fukushima, it raises serious questions about the safety with respect to commercial nuclear power plants.

I will tell you I will never forget looking at those spent fuel rods in spent fuel pools near a body of water. Trying to think through the implications of what happens if you have another earthquake which triggers a tsunami. The prospects that would have for releasing radiation, which of course heads in our direction.

So there is no way around the need to make sure spent fuel and the nuclear waste from these plants is safely managed and find a permanent way to dispose of it. I think the Department is aware that Senator Murkowski and Senator Alexander and Senator Feinstein and I are working on a bipartisan effort to get the Federal Government back into a problem-solving mode on nuclear waste storage and disposal. We hope to be able to have more to discuss on those bipartisan efforts here before long.

Now you've been to Japan since the accident. You have been involved in our government's efforts to help the Japanese deal with Fukushima and look at the implications of what happened there. I think you all are aware of the letter I sent as well because I think those efforts you're making are important.

Given the challenges for making nuclear power plants safer and the challenges of finding solutions for nuclear waste I was struck by the fact that while you propose to increase the Department's energy programs by over a billion dollars, you propose cutting funding for nuclear energy by over $100 million, including all 5 million for the integrated university program that provides grants and fellowships to graduate students in nuclear engineering.

When I thought about my visit to Fukushima-talking with people there-and our academic efforts, our research efforts are ones they could only dream of. They will say that. It seems to me that if there was ever a time when we need nuclear engineers and investment in safety in nuclear waste technology, this is it.

So priorities, yes, with you all the way. But why such a large cut in an area that there is great concern today? It increases.

As you know, there are current efforts being initiated by scientists around the proposition that so many of our reactors in this country seen from a mechanical standpoint to be configured in much the same way as, you know, Fukushima. So we are going to need more nuclear engineers. We're going to need to increase the investment in nuclear safety. There's a big cut in a program right at a time when we need to make it a higher priority, in my view.

Mr. PONEMAN. Mr. Chairman, first of all, once again I have to agree with the premise of all that you've said about the importance of supporting Japan as it works its way through the aftermath of Fukushima. We have ramped up and expanded our cooperation with Japan to include environmental management, emergency response and cleanup. It's going to remain very important.

Also, I can't exaggerate the positive reaction that we have had. I've done this myself a couple times when we have actually made announcements about university grants under those nuclear energy fellowships. It's incredibly important for our own future that we rebuild a pipeline of scientific and technological expertise.

The $5 million in question you're referring to is actually been moved to a government wide stem initiative. So we are going to

continue supporting the student activities that you're talking about. But it's, as a bookkeeping matter, it's being now integrated into a government wide approach.

The CHAIRMAN. We'll get into the ever eye-glazing process of looking exactly where funds are moved. Our understanding is it's not been put into the nuclear part. That it's gone into a general area.

Is it your understanding that it's actually going to be spent in the nuclear area?

Mr. PONEMAN. Mr. Chairman, I was told that it was put into an integrated stem effort, the degree to which there is within that overarching effort, individual allocations in the different subject matters. I would wish to get back to you on that. I will get back to you about that.

The CHAIRMAN. Let's do that because we want to get it specifically into this nuclear safety and nuclear waste area. I understand what you're talking about. I think you'll have a lot of supporters of stem up here. But if it just gets thrown into the mix, particularly with the funding shortage, this still could get lost. I think that would be a mistake. So let's go back and forth with our staff.

Mr. PONEMAN. OK.

The CHAIRMAN. Because our understanding is that whatever has happened in terms of moving it somewhere else, it is not going to be specific to nuclear. That strikes me, given what I saw.

I'll let Senator Murkowski speak for herself, but both of us made those visits. You don't forget those visits.

Mr. PONEMAN. No.

The CHAIRMAN. OK, Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

Once again, I'm concurring with you a lot here this morning. That's probably a good thing.

The CHAIRMAN. Yes.

Senator MURKOWSKI. I'm all over that.

Senator Barrasso would like this article that he referenced regarding Canada and the U.S. regarding the LNG race, he wanted that incorporated as part of the record.

The CHAIRMAN. Without objection, so ordered.

Senator MURKOWSKI. I have just one follow on question here for you, Deputy Secretary.

This relates to unconventional resources. The budget is once again zeroing out funding for the unconventional fossil energy technologies program. I think we recognize, as I mentioned in my earlier comments, I'm one who thinks that a very appropriate role within Department of Energy is to focus on the R and D side. How we can really move forward these technologies that are going to make the difference for us into the future for our energy and our energy portfolio.

We've got great opportunities, I think, in unconventional resources like our oil shale, our heavy oil, our tar sands. If we're really going to subscribe to an all of the above energy policy, I think it is important to recognize that we have huge opportunities there. Yet, in this particular line item on the budget, we have zeroed it out.

I'll also point again to the methane hydrates issue that I referenced in my opening statement. Again, I think there is enormous potential for us out there. The study that was completed by USGS suggests that the amount of gas hydrates here in this country exceeds the volume of known conventional gas resources were saying we're the Saudi Arabia of natural gas now. We're not even talking about the unconventional resources and the potential for us there.

One potential source of funding for the methane hydrates has been, historically, in the unconventional fossil energy technologies program. You know, the budget now, as it stands, shows a 16 percent increase in funding for the natural gas technologies program. How much of this increase in funding might be possibly made available to R and D related to methane hydrates to the unconventional gases as opposed to the conventional side?

If you could just speak more generally——

Mr. PONEMAN. Sure.

Senator MURKOWSKI. To what's going on with unconventional resources.

Mr. PONEMAN. I'll address both, Senator. Thank you for the question.

Again, I must agree with the premise. When you think of the technological breakthroughs in fracking that were one of those earlier investments, that's also, of course, part of what's unleashed the unconventional oils. We have now had like 5, 6 hundred thousand barrel per day increase year on year out of Bakken, Eagle's Ford and so forth which I think, as gas prices have gone down and the rigs have moved off the dry gas place. We've seen this incredible upsurge.

So that is a tremendous benefit. We expect perhaps even 700 thousand barrels year on year next year. Point one.

Point 2. Many of the projects that are, of course, being invested in under our coal portfolio, $6 billion we've got invested, are looking at ways to add the ute to CCS, utilization in which enhanced oil recovery. Yet another way to enhance our development of unconventional oil resources. That is also very important.

So we are going to continue in the area of liquids.

Secondly on the question of gas resources. I would note in addition to the fracking investments we've made back in the day, we put $30 million into coal bed methane development which also has now produced tremendous benefits. In the area of methane hydrates it is potentially years out, admittedly, this tremendous bow wave of yet additional gas resources. We were very happy and gratified to have very successful results in your home State of this experiment.

Part of what happens is we do try to promote public/private partnerships so that in these budgetary constrained times we can leverage even a small investment. The government of Japan, as you know, and a U.S. company ConocoPhillips developed a cooperative with us in that case. We're going—we've got $5 million dedicated to carry on the first successful drilling that we did in Alaska. We're going to be following up on that in the year ahead.

We agree that the methane hydrate play, in the long run, could in fact be the next gas revolution of a tremendous scale.

Senator MURKOWSKI. I appreciate you giving that background. We have had, I think, a pretty successful partnership with Japan, who is very, very keenly interested in this and willing to work with us as well as on the private side. I think it is the model. It's something that we can look to and say this is how we can really help to push these out.

But all appearances now seem to be that the U.S. is backing away from this. I was just over in Japan. The chairman mentioned our trips to Fukushima. We went at different times, but part of my trip was also to speak to the Japanese about opportunities between Alaska and Japan on a host of different issues.

The Japanese interest, of course, in pursuing the methane hydrates. Furthering that partnership is pretty keen. But the message that I heard from them was they're very worried that we're withdrawing from that. We're pulling back. We're pulling back the resources. We're losing interest.

I think this is again, an area where we can be leading. But it takes that commitment of resources and just the focus on where we go with the future of this.

Thank you, Mr. Chairman.

Senator Heinrich.

Senator HEINRICH. Thank you very much, Mr. Chairman.

At first I want to, as an engineer, maybe throw a wrench in the logic. You mentioned how logical things have started to get around here. I want to make the point that sometimes things that seem logical are not necessarily logical even though they intuitively seem that way.

In particular when it comes to nuclear reductions I'm a major advocate for the new start treaty. I think it was absolutely appropriate and critical. But the relationship between reducing those numbers and the cost savings that that may or may not incur is not a linear one. It's not a proportional one. As long as we have one nuclear weapon we're going to need the infrastructure in place to make sure that it is safe, secure and reliable.

We have abided by the comprehensive test pantry for many years even though I don't believe that was ever approved by the Senate. It's good policy for us not to be testing nuclear weapons, in my view. It would be cheaper if we just tested it. It's more expensive to have the super computers to make sure that those things remain safe, secure and reliable and to be able to do that testing virtually as opposed to actually exploding nuclear devices.

So I just want to caution my colleagues that sometimes and I think we're going to have to tackle the issue of tactical nuclear weapons with some of our, you know, some of the other actors in the world, in particular Russia and the numbers of those that are out there right now. But it won't necessarily create an enormous savings to be able to spend on other priorities, even priorities I care deeply about such as renewable energy, continued research in some of these other areas.

I want to talk a little bit about diversification and ask you a question, Mr. Poneman, about the work that's done at our national security labs and how it complements their core mission. I'm a little concerned about the constraints on so called work for others. These are imposed, sometimes they're just conflicting management

between NNSA and DOE and the different kinds of research that gets done at the national labs.

I'm curious if you think that there are ways to make that easier for the labs to foster those new partnerships with both governmental, university and private entities to make sure that those constraints on work for others aren't holding our labs back from their full potential and in particular with regard to tech transfer.

Mr. PONEMAN. Senator, it's a great question. I would say we have worked very hard. I personally spent a lot of time on trying to make sure that the incredible resources in technological expertise of our labs is made available. In fact, I've asked that we stop calling it work for others because that has a sort of alien sound to it. It's really work for the Nation. It's work for the President.

Senator HEINRICH. Right.

Mr. PONEMAN. Now what we have done, again, and you'd expect this of us, I think, in these budgetary straightened times and to avoid the kind of duplication that some of your colleagues have mentioned is we have gotten together what we call a mission executive council. So with the Department of Homeland Security, the intelligence community, ourselves and the Pentagon, we sit down. Instead of having little projects where you, as we say, buy wine by the glass, we say let's invest in the vineyard.

If we need a capability to do something, it might be a high powered computer. It may be nuclear material detection.

Let's make sure that we put our heads together.

Get the incredible technical expertise of the labs.

Harness it to that effort.

Promote it.

We have done everything we can from DOE headquarters, Senator, to promote that kind of thing. If that is not happening, if you are getting the impression somehow that it is impeding that kind of work, I would certainly like to hear more details about it because we are trying to do really quite the opposite.

Senator HEINRICH. We'll share some of that with you. At times it's been an issue of silos, once again, where in a certain area we hit a cap on work for others. Yet there was much more administrative capacity in another department. So with some work we're able to move things around.

But part of it's also the issue of making sure that when work for others is done. I like your idea of calling work for the Nation, that somehow we deal maintaining the administrative capacity to do all the work because it doesn't necessarily address that sometimes.

I want to thank you also, something that the chairman brought up, the DOE's focus on energy storage. I think that's critical. It could be a real game changer.

My last comment would simply be on this energy security trust fund. I love the idea, but I would caution us just as much as the ranking member on, you know, impacting the land and water conservation fund, the reclamation fund, the other places that have already been—that are already tied to these revenues.

We just had a hearing the other day where Senator Franken very rightly brought up how much money is theoretically in the reclamation fund verses the paltry 40 million that is in the President's budget to fund very real needs on Indian reservations across

the Western United States. Communities that only have 10 years or less of water left available to them. The Land and Water Conservation Fund, another critical area.

So we need to make sure that those are not endangered by the creation of a new trust fund.

Thank you.

Mr. PONEMAN. Thank you.

The CHAIRMAN. Senator Heinrich, thank you.

I was just thinking how useful it is to have an engineer in this committee because if anybody is going to talk about policies being linear, you're going to be able to tell us whether they are, in fact, linear. So I appreciate the points you're making. I'm going to work closely with you and understand the importance of these issues to your State as well.

We'll be following up.

Senator Franken, additional questions?

Senator FRANKEN. I would just underscore that in comedy we do non-linear thinking.

[Laughter.]

Senator FRANKEN. Mr. Poneman, I'm a big believer in research and development. The U.S. has the best scientific talent in the world. We have premier universities. We have a culture that promotes entrepreneurship and innovation.

As a Nation we've already used the strength to become leaders in biomedical research. That's because of sustained research funding from NIH which has produced a cadre of biological researchers who are making important discoveries in the field of health and medicine every day. That's terrific.

But I don't see any reason why we shouldn't be able to replicate this for bio energy research. After all bio energy research utilizes some of the very same tools and expertise that biomedical research uses.

You can study a microbe to better understand the disease it causes. You can also engineer a microbe to produce renewable biofuels. We're focused and dedicated. If we are we will kick the fossil fuel dependency with advances in renewable fuels.

First, I think bio energy should just be a bigger priority than it is currently. I hope that we can work together to make that happen.

In addition this—and what I'm hearing from scientists in Minnesota and elsewhere is that the grant funding process at DOE needs to be improved. When I hear from biomedical scientists in Minnesota they do talk about NIH being easier to deal with on this kind of grant funding than DOE. Not just for bio energy, but across the various program offices. I'm told that often DOE grant funding process can be cumbersome, costly and time consuming.

Can you describe the Department's grant funding process and tell me where you think there is room, may be room, to make it less cumbersome to researchers, more transparent and more effective?

Mr. PONEMAN. Senator, I'm happy to do that.

It's a very important point. What we have been trying to do is where we have adopted some of these better newer, more agile grant procedures, we're trying to propagate across the department.

I'm talking specifically about the standing up of ARPA-E with the initial contribution of funding under the Recovery Act.

We had a chance to develop a process in the following way.

Come up with a specific idea of where we think the innovation might best be found.

Quickly pull together a workshop that gets lots of academic, industrial expertise. So that the terms of reference for a funding opportunity announcement can be articulated, announced, released to the public.

Get the widest possible response.

Then to line up, especially since they were so heavily oversubscribed by like a factor of 100 in the first solicitation, to line up expertise of this interested peer reviewers who've got expertise, but no axe to grind.

To do this in obviously an expeditious manner.

We found that by, sort of, starting with a blank slate and doing this fresh with a new set of players, frankly, and a real drive of urgency under the Recovery Act that the ARPA–E mechanism was much better than the traditional mechanisms that we had been using in the Department in the advanced energy portfolio. We're now trying to bring those best practices over. We are certainly open to learning if there are other best practices at places like NIH that could further accelerate and make transparent, but also rigorously and analytically, neutrally reviewed processes.

Senator FRANKEN. This is an area where I'd like to work with you, if I could.

Mr. PONEMAN. We would love that.

Senator FRANKEN. To make sure our tax dollars are spent more effectively.

Mr. PONEMAN. Yes.

Senator FRANKEN. I'm going to try and do this fairly fast because I don't want to use other people's time.

But we're experiencing a natural gas boom in the country. We also know that the combustion of natural gas produces fewer greenhouse gases, gas emissions than oil and coal. But there are also fugitive emissions or methane leakage during the extraction processing and delivery of the gas. Methane is a potent greenhouse gas and a highly—and high hydrates could diminish the climate benefits of natural gas.

Studies have attempted to determine the leakage. What—just to jump to the chase here, you know, if the leakage is greater than some might have calculated this might undercut the benefits in terms of emissions. My question basically is what is DOE doing to better understand and grasp natural gas fugitive emissions?

Mr. PONEMAN. It's a great question, Senator. This problem was acknowledged in the subcommittee report of the Secretary of Energy Advisory's board study on natural gas. Part of the problem here I know Dr. Moniz has emphasized in his remarks to the committee where we do add value is in analytically data driven analysis. We don't do all the regulations some of the other departments such as Interior do.

With the methane question one of the challenges is not having a good baseline of data. We don't know what was going on before. So I think where the Department of Energy specifically can add

value in this is in trying to help analytically establish what the base line from which we are measuring the delta of the added increment, if any, that comes out of the frack wells would be.

Then in having a base line and then analyzing the wells vis & vis what was the ambient nature of the methane emissions before come up with a deeper understanding. That is incredibly important to make sure that what you have just warned about does not occur. That we inadvertently somehow developed a resource which could be and should be one that reduces us in our carbon emissions, gets us on a path to a low carbon future. But if we're not attended to all aspects of it such as the possibility of refuted methane emissions, we will obviously potentially undercut that.

Senator FRANKEN. I'm sorry, but just let me make sure I understand this. The delta is the delta from what happens when you have a extracting, you know, through whatever process we're using the natural gas verses what exists in nature?

Mr. PONEMAN. Yes.

Senator FRANKEN. Is that the delta?

Mr. PONEMAN. I am not sure that they have, Senator, pre and post well drill data on what the methane emissions are in all of these cases. That's, again, unlike Senator Heinrich, I'm not an engineer. But that's my understanding of one of the things that they are looking at.

Senator FRANKEN. OK. I know what a delta is. I'm not an engineer, but in comedy we use delta a lot, usually as the name of a fraternity.

[Laughter.]

Senator FRANKEN. I guess I have enough time for the next question?

OK, you know, if you're doing a fake fraternity you do delta, delta, chi or something.

OK, I want to express my support for the weatherization assistance program for low income families, seniors and individuals with disability. This program is crucial for protecting these families especially during cold winters in Minnesota. I believe your budget should have been stronger on this program. I mean, I go to work to make sure people get the assistance that they need.

Is the Administration committed to making sure that the weatherization assistance program meets the needs of the people in cold climes in this country, in Minnesota and elsewhere?

Mr. PONEMAN. Yes, Senator. It's a very important program. We've got obviously a very significant assistance, the $5 billion in the Recovery Act for it. We are now, as you've noted, having challenges with the requests we have put in not having fully funded. But we are committed to this. We're committed to optimizing the lesser resources that we, in fact, received to make sure that every State continues to be able to have a weatherization program for people who are in cold climes are protected.

Senator FRANKEN. Can we expect a distribution formula from DOE that is fair to every State?

Mr. PONEMAN. We are attempting to do just that, Senator. We'd be very happy to stay in close touch with you on that.

Senator FRANKEN. Thank you very much. Good to see you again.

Mr. PONEMAN. Thank you. Thank you for the trip to Minnesota was very educational.

Senator FRANKEN. It was fun.

Mr. PONEMAN. Thank you.

The CHAIRMAN. Thank you, Senator Franken.

I think we are all, as a result of this hearing, going to be linear specialists. We are going to find a way to rally around that cause.

I gather Senator Heinrich doesn't have any other questions. I'm going to leave you with one last point, Secretary Poneman.

You touched on it in your comments earlier with respect to some of the work the Department did in terms of fracking research. It just highlights my concern, particularly about some of these cuts we've talked about that look so integral to the future, like energy storage. I mean, solar and wind, of course, are intermittent sources of power. They are not there forever.

Energy storage is going to be absolutely key to their future. I think you've heard my fairly vociferous comments about my concern in that area. Dr. Moniz was very responsive in terms of saying that within 30 days of his confirmation, we'll get a plan in this area.

But the reason that research is so critical, and we understand there's plenty of research in the private sector. It's not as if the Federal Government is the only entity in America that does research. It just helps us drive down costs, particularly early on.

I've been struck going back and looking at the history of gas development, the recent history. It was not very long ago in a lot of influential quarters people were saying it really probably is too expensive to get oil and gas from shale. But despite the research taking place in the private sector,the Department put significant research effort into fracking issues and to matters relating to directional drilling. It was a factor. It helped make natural gas cost effective, not the sole reason, but it helped make gas cost effective.

That's what we want to do, especially in renewables and at this crucial time. This country wants to see renewables play a bigger role in base load power. I'm absolutely convinced that this country wants to see that.

The challenge is going to be to drive down the costs of these renewables. That's what people are looking for. They're looking to see that renewables are cost competitive with the traditional kinds of sources.

So when we see the reductions in some of these areas that we've highlighted, whether it's energy storage, hydro, or other kinds of areas, it comes back to where we think the Department has a track record. You highlighted it in your statement with respect to a number of areas, particularly natural gas most recently.

We want to make sure that we bring that same kind of effort on the research side in renewables at a pivotal time when it can help us lower the costs. Particularly get to where the American people want to go, which is a transition to a lower carbon economy. Understand that to do it is to make those renewable sources a bigger role of base load power.

Now I thought that was going to be the last word on the subject, but I understand that Senator Manchin is on his way. So why don't

we let you respond to that point with respect to the research function.

Mr. PONEMAN. I would like to, yes.

The CHAIRMAN. That will ensure that I don't just filibuster until Senator Manchin arrives.

Mr. PONEMAN. OK.

Mr. Chairman, I think that was eloquently expressed and profoundly correct. Our value at the Department of Energy is just as you say in the R and D to drive down costs.

Many countries have experimented with such mechanisms as feed in tariffs and so on. Often these efforts have just run into challenges because they end up subsidizing inefficiencies. So when we promote a sun shot approach, model on the moon shot, talking about bringing the modular costs of solar down to a dollar a watt to the extent that we can actually get not just the modules which of course themselves have come down in cost, but then the balance of plant, the inverters, the installation.

Get those costs down so what you're talking about the potential of 5 to 6 cents per kilowatt/hour levelized cost of electricity. Now a renewable source can compete toe to toe with conventional forms of energy.

Same thing has happened, obviously in the area of wind. We're now with extension in the production tax credit in a place where onshore wind has become quite competitive.

But the other point that you made, Mr. Chairman, I think is equally important. Sometimes, if I may say, when one looks only at the DOE piece of the puzzle it might look like a shrinking effort. But sometimes we're trying to think where is the value add proposition.

At such point as the private sector can come in a make an investment. That's a very important thing at such point as such efforts as the Congress which made a limited time tax benefit available can help take up the baton from where the Department left off with the research on horizontal drilling and so forth. On the back of the good efforts after we made those investments by the Gas Technology Institute, this is how we can work together to do exactly what you say.

Drive technology to a place that costs come down. Ideas like those advanced by Senator Coons which you've also commented on bring the cost of capital down which would be critically important since in many of these cases there's no commodity pricing risk because wind blowing and sun shining notwithstanding whatever else may happen in the commodity markets. This is how, I think, our department can work with members of this committee in trying to drive this energy economy to that low carbon, prosperous future, bring in lots of American jobs and a much better future. So we would just welcome any opportunity to continue our work with you on that.

The CHAIRMAN. Very good.

Let's give the last word to Senator Manchin.

Senator MANCHIN. Thank you, Mr. Chairman. I am so sorry, but thank you. You've been so kind.

Sir, first of all, thank you for coming. Let me make a statement up front that I'm for an all in energy policy that uses every re-

source we have in this great country. I mean that. I think I've told the chairman this.

I'd like to start by expressing my dismay at the direction that the President's budget is taking. I'll say that this budget doubles down on energy efficiencies and renewables, asking for almost a billion dollars in additional funding while cutting fossil energy funding by $95 million, about 18 percent from the fiscal year 2012 levels which are historic lows.

Now let's put this in perspective. Let me just show you, sir.

Why don't you look at this? This is your alls figures, Department of Energy. Where our energy comes from. Where is it expected to come from by 2040? It doesn't take, you know, a rocket scientist to figure this out. That's where you're going to be in 40 years even if you want to bump that to 20 percent. That's the most it's going to be.

Now let's go on to some more here.

Brings funding—you're bringing fundings for renewables and efficiency to $2.7 billion for 16 percent return by 2040.

You know, I'm all for everything. Let me show you where you're money is going. Look at this, Mr. Chairman. Look at this where they are spending their money.

Energy, that's fine. But 70 percent only gets 16 percent return? That's not a good investment for the money.

It's got to be a balance. I'm asking for a balance, sir.

If you're telling me that you're expecting 35 percent to come from coal.

You're expected nukes to do 17 percent.

You're expecting natural gas to do 30.

Look what you did to them. You must not be helping them very much to get there. They must be doing it all on their own because they're not getting much help from you all.

That's all I'm asking for. All I'm asking for. Then if you look at global coal demand, 8.1 billion tons being burnt in the world. I'm as concerned about the climate in West Virginia as anybody is anywhere in this great country. We only burned 890 thousand tons of coal last year, 11 percent of the world burn.

I'm not a scientist. But if I think the climate encompasses the whole globe, right.

Mr. PONEMAN. Yes, sir.

Senator MANCHIN. You would think that we're going to make a difference in the whole world even if we cut 11 percent of the production of the coal if we cut all of it out. Wouldn't you think that if we invested a little bit more with the amount of consumption the world has right now that we could find a technology to use the resources we're going to depend on for a long time? Maybe help other countries clean up what they have?

Sir, I'm just asking——

Mr. PONEMAN. Yes.

Senator MANCHIN. For a little bit of balance here. I'm more than, I think the chairman knows, I'm more than happy to work with anybody. But I think you have to admit this is a little bit out of balance, is it not?

Mr. PONEMAN. Senator, let me first underline a strong degree of agreement. I've been watching these EIA numbers for a long time.

It shows coal 35 percent there. Most of my educational background coal has been half of our power generation. It's been fluctuating in no small measure because of natural gas prices.

Senator MANCHIN. But worldwide it's going up, correct?

Mr. PONEMAN. That is correct, sir.

So all by way of saying in agreement with your premise, coal is and will be a very fundamentally important part of our power generation and globally.

Senator MANCHIN. We in West Virginia want to show you and work with you how to use it better.

Mr. PONEMAN. We do too, Senator. We have, and I think you know this, we have a $6 billion investment in combination of our CCPI and our carbon capture and sequestration projects. We've just approved phase 2, 2.0. Interesting to see in a retrofit context what oxyburn will be able to do for the boilers.

We, all of us, and you know, of course——

Senator MANCHIN. Sure.

Mr. PONEMAN. Dr. Moniz has literally written the book.

Senator MANCHIN. Oh, I know he has. That's why I said very hopeful, very hopeful.

Mr. PONEMAN. So we do want to work with you. I think we see, in terms of providing clean base load power generation, the——

Senator MANCHIN. So you're saying you all didn't put this type of request in from the President's budget? How you want to spend your money?

Mr. PONEMAN. No, what I'm saying, Senator, is that's one piece of a larger effort where we're leveraging investments that we've made and the portfolio we have out there in terms of the very large, you know, multi building investment.

Senator MANCHIN. But you've increased. You're up to 70 percent, 2.7 billion on this right here.

Mr. PONEMAN. We're seeing results in that. You said you're in favor of all the above——

Senator MANCHIN. Oh, I am in favor of all of the above.

Mr. PONEMAN. So are we.

Senator MANCHIN. Don't you think you should be doing maybe, let's say you did 25 and 25 and 25 and 25, not 70 and 19, 11 and nothing.

Mr. PONEMAN. But, Senator, what I'm saying is there are different things, apart from the pure R and D as opposed to some of the deployment strategies in the area of coal. Obviously we have a tremendously out there of coal fired plants. So some of the issues to be addressed in coal space have to do with retrofits and things that can be demonstrated through such things as our carbon capture and sequestration.

Senator MANCHIN. But, sir. That, as you know, the National Energy Technology lab——

Mr. PONEMAN. I visited.

Senator MANCHIN. You know. They do tremendous work. There's the ones that basically developed, with the private sector, as far as the fracking and defining and unleashing all this gas that we have now. We have it in Marcellus shale in West Virginia. I'm very proud of that.

But they're getting cut continuously.

Mr. PONEMAN. Part of it, Senator, is as I was just telling the chairman, we are trying to make sure that we leverage the Federal dollars as best we can where there are existing industries that can co-invest with us and help us get the same results. That's what we're doing.

Some of the earlier phase investments in some of the renewable areas, those are much longer term investments. You know, we have seen actually huge payoffs.

We put $2 billion into solar investments in terms of getting cheaper modules. That's got a $9 billion payoff.

We put a billion dollars into improved combustion technology. We saved $70 billion in truck fuel.

We put $4 billion in wind technology producing a $15 billion benefit.

So we are definitely, Senator, with you in looking for where the payoff is and where the high returns are. Be very eager to work with you, particularly in these coal based areas because there's 2 things we've got to do.

One is we've got to test out, so we can maintain the confidence of the American people in these saline formations or EOR, enhanced oil recovery, that the CO_2 sequestration is effective over time.

Secondly we really double down on the capture and getting cheaper more efficient forms of capture.

Those 2 things which again, Dr. Moniz has written eloquently about, I think will be the ticket to doing just what you want which is keeping coal a vibrant part of our energy portfolio.

Senator MANCHIN. I was just told that I understand the funding has been reduced for sequestration. Is that correct?

Mr. PONEMAN. I don't quarrel with the specific R and D numbers. We, across our portfolio, Senator, we are finding—we are trying to do more with less.

Senator MANCHIN. Sir, I'm really not trying to be—I'm really not. I think I just appreciate the chairman so much and the ranking member. They've been so kind. They've come to my State. They've seen the State. It's all in.

If we just the Federal Government working with us as a partner and not an adversary or an enemy, but an ally, that's all I'm asking for.

Our little State has done a lot of heavy lifting. I think you know that. Over the years we've helped develop this great Nation with the energy we've produced. We just want a partner. We want somebody that understands our value and works with us, not against us.

Mr. PONEMAN. I think we're there, Senator. Let me just say of the 8 projects that we've got in our existing portfolio. We have one air products that's in operation. We've got 2 that are under construction. We've got 2 that are close to financial closure. We've just approved phase 2 of Future Gen 2.0.

We are very strongly committed to this. We're promoting it. We wish to work with you further on it.

Senator MANCHIN. I'll be anxious to bring programs to you that I think have tremendous value, not just for my State, but for my country. Be happy to bring them to you, sir. Thank you very much.

Mr. PONEMAN. We will be very pleased to work you, Senator.

Senator MANCHIN. I'm so sorry, Mr. Chairman.

The CHAIRMAN. No, no, not at all.

Secretary Poneman, I think what Senator Manchin is talking about here-and I just want to say to him because we talked about it a bit when I was in West Virginia-I'm about as pro-renewables as anybody around whether it's hydropower . . .

Senator MANCHIN. We have it all, don't we?

The CHAIRMAN. Biomass, geothermal. In my home State, Senator Manchin has heard me say this, I think a lot of folks think we've got green in our chromosomes. So we very, very much are committed to this future of a lower carbon economy.

But Senator Manchin, I know you're doing important work on this gun violence issue. The first question that I asked this morning relates to your point. That was how can the Department justify cutting the fossil energy research budget by 15 percent.

It directly relates as you suggest——

Senator MANCHIN. Thank you.

The CHAIRMAN. To some of the ongoing work. We're starting our natural gas workshops. We want to have best practices. Something that I think you and I and Senator Murkowski have talked about.

Senator MANCHIN. Yes.

The CHAIRMAN. We have our industry people, the environmental people, and scientists together and we try to find some common ground.

So I want you to know as somebody who is resolutely pro-renewable, I think this point about cutting the fossil energy research budget by 15 percent, which essentially encompasses your question, is a very valid one. I'm going to work very closely with you. You're chairman of the Mining Subcommittee, so we're going to work on those issues.

Senator MANCHIN. You've been very kind, sir. I appreciate it. I really do.

The CHAIRMAN. Alright. On that, Secretary Poneman, you've been pummeled enough, I think, this morning.

[Laughter.]

The CHAIRMAN. We'll excuse you at this time.

Mr. PONEMAN. Thank you, Mr. Chairman.

The CHAIRMAN. The committee is adjourned.

[Whereupon, at 11:41 a.m., the hearing was adjourned.]

APPENDIXES

APPENDIX I

Responses to Additional Questions

RESPONSES OF DANIEL B. PONEMAN TO QUESTIONS FROM SENATOR WYDEN

Question 1. Termination of DOE Graduate Student Programs-DOE's 2014 budget proposes to eliminate or reduce a number of programs that support graduate level education in critical areas that support DOE's missions. As discussed in the hearing with Deputy Secretary Poneman, the Office of Nuclear Energy is eliminating the Integrated University Program (-$5 million) at a time when the Department itself is expected to need to engineer, construct, and operate tens of billions of dollars' worth of nuclear weapons, nuclear waste, and fuel cycle facilities, and when the Department and the nuclear industry face significant challenges in improving nuclear reactor safety and waste management and disposal. In the Office of Science, the Workforce Development for Teachers and Scientists Program budget cuts more than half of the funding for the Graduate Student Research Program (-$3 million). The Office of Science is also eliminating the DOE Computational Science Graduate Fellowship program (-$6 million). DOE claims that these cuts are justified because their function will be subsumed by a consolidated National Science Foundation STEM program. I am concerned that a broad NSF program will not ensure that the educational needs of the mission-specific disciplines required by DOE will be met. Please explain and demonstrate how DOE's mission-specific needs will be met if these cuts occur.

Answer. The Department has a long history in supporting the training and education of future scientists and engineers at the graduate level; the majority of this training has occurred through the support of graduate students through research awards to universities and DOE national laboratories, rather than through specific graduate student education programs. For example, the Office of Science supports over 4,500 graduate students annually under research awards sponsored by its six research program offices. The Office of Science Graduate Student Research Program is proposed to be restructured in FY 2014 to support segments of a graduate student's thesis research at a DOE national laboratory. The FY 2014 request will support approximately 100 graduate students to conduct graduate research directly tied to Office of Science research priorities. The Workforce Development for Teachers and Scientists (WDTS) program will work closely with the Advanced Scientific Computing Research (ASCR) office to help ensure that the Graduate Student Research program addresses graduate training in computational science areas that are relevant to the ASCR mission.

We are committed to working closely with NSF as they develop the details of their enhanced National Graduate Research Fellowship Program (formerly the NSF Graduate Research Fellowship program) and with the National Science and Technology Council's Committee on STEM Education (CoSTEM), to help ensure the mission needs of DOE are met in graduate level education and training.

Question 2. In March of this year DOE's office of Nuclear Energy released its second Funding Opportunity Announcement (FOA) for the small modular reactor (SMR) licensing support program. The FY2014 budget includes a small $3 million increase for this activity. According to the announced procurement schedule, industry bids are due July 1, 2013. DOE has indicated it would announce an FOA award as early as September 17, 2013. It is unclear whether or not SMR funding will be divided among 2 proposals—one for each FOA— or among three proposals should DOE elect to make two awards in this second round. Does DOE believe there is ade-

quate funding to fund three proposals and does the Department intend to make these awards before the end of the current fiscal year?

Answer. The Department plans to make a selection of prospective awardees from our Small Modular Reactor (SMR) Licensing Technical Support program funding opportunity announcement (FOA) for the development of innovative SMRs by the end of the fiscal year and negotiate and award the cooperative agreement by the end of calendar year 2013. It is the Department's intent to make one additional award on this FOA; however, we may decide to select additional awards if applications with sufficient merit are received. The award made through the current selection process will be covered under the program's approved funding profile of $452 million over six years. The exact split will not be known until we complete the cooperative agreement negotiations with the selectees.

Question 3. "The President's FY 2014 Department of Energy Budget Request contains a large increase in funding for Vehicle Technologies and specifically mentions a department- wide, cross-cutting initiative called the EV Everywhere Grand Challenge which aims to make the United States the first country in the world to invent and produce plug-in electric vehicles that are as affordable and convenient as gasoline-powered vehicles by 2022. At the same time, funding for other alternative vehicle technologies, like hydrogen fuels cells, is decreased or remains stagnant. Are we to understand, then, that the President favors electric vehicles over other forms of alternative fuel vehicles such those powered by hydrogen fuel cells or natural gas? If so, isn't that having government pick winners and losers rather than having the market decide which types of alternative vehicle technology are best suited to replace gasoline powered vehicles?

Answer. The Department is committed to pursuing a portfolio of vehicle technologies that, collectively, can reduce our dependence on oil and works closely with stakeholders—including the automotive industry—to develop its technology portfolio and adjust it as needed. It is clear that vehicle electrification is an essential and significant part of the Administration's effort to transition from oil to more energy secure alternatives. . The global automotive industry is already moving in this direction. Electrification will benefit not only our national economy and energy security but also individual consumers—today's electric vehicles can "fuel" for the equivalent of about roughly $1/gallon, and the next generation will bring even bigger savings. It is also important to note that advances in batteries and other electric drive components support the continued development of not only plug-in electric vehicles (PEVs) but also hydrogen fuel cell vehicles (which are also electric-drive vehicles). In addition, the Department's robust support of materials technologies for vehicle lightweighting will benefit all vehicles, regardless of size or propulsion technology.

Although initially slower than some projected, the PEV market is now growing quickly. Sales increased by 200 percent in 2012 and are climbing more rapidly than hybrid electric vehicle (HEV) sales when HEVs were first introduced roughly a decade ago. In addition, the number of vehicle models available is on the rise—fifteen new hybrid, plug-in hybrid, and all electric vehicles are expected in model year 2013 and 2014 from numerous original equipment manufacturers. Although early market PEVs have won critical acclaim with awards and these early successes are important, it will take many millions of vehicles to truly transform the transportation sector and significantly reduce our dependence on oil. As such, we need to continue to pursue the research and development needed to further reduce cost and improve performance to move PEVs from early adopters to the mainstream. This is the focus of the EV Everywhere Grand Challenge.

Question 4. One of my guiding policy principles is to enable the United States to move towards a low-carbon economy, both to address the threat of global climate change and also to remain competitive in the global clean energy marketplace. The DOE's efforts in this regard represent a critical piece of this transition, and choices DOE makes tilt the playing field for different technologies. I'd like to understand what the overall strategy is behind some of the choices. I often talk about what I call the 'forgotten renewables', geothermal energy and hydropower, two clean sources of energy that the United States has in abundance. The DOE budget request treats geothermal favorably, increasing the budget by about 60 percent, but research into hydropower takes a cut. Given the estimates of untapped potential in hydropower resources—upwards of 60 gigawatts of emissions free generating capacity—why has hydropower been deemed less important than it was in the previous budget?

Answer. The DOE budget request for water power research, including hydropower, is $55 million for FY 2014. This budget request reflects DOE's emphasis on research and development in water power (both hydropower and marine hydrokinetic technologies), and provides evidence of our intent to support the real-

ization of the technologies' full potential as a clean energy technology option for our nation.

More specifically, DOE has a vision for water power to provide 15 percent of the nation's electricity by 2030, and hydropower will play a large part in reaching this goal. Hydropower already provides about 7 percent of the nation's electricity, but there are opportunities to increase hydropower generation in a variety of settings, including non- powered dams, conduits, and new sites.

DOE takes an integrated approach to decrease technology costs and market barriers to advance the deployment and optimal use of hydropower technologies. DOE's hydropower activities in FY 2014 focus on developing advanced hydropower technologies and components at lower cost, using pumped storage to support grid integration of variable renewables, and supporting advanced manufacturing of lightweight turbine materials. In addition to the focus on component cost reduction and renewables integration, other ongoing efforts include: developing advanced, cost-effective environmental and aquatic species monitoring sensors and optimization tools; demonstrating, testing, and evaluating advanced turbine designs and other innovative technologies that co-optimize electricity generation and environmental performance; and facilitating stakeholder engagement to provide for public participation in development of new hydropower.

Question 5. Last week, DOE said that DOE's contribution to ITER for FY2014 would be $225,000,000 and that DOE had agreement that its annual contribution going forward would not exceed this amount. DOE then said that DOE's contribution would be capped at $2.4 billion, including the cash contribution. Is the $2.4 billion, a cap on the total U.S. contribution, including prior year funding, or the $2.4 billion cap applied to future funding. Looking at the DOE budget materials, (page SC-196), it looks like the last time they provided a total estimated cost or total project cost for ITER was in FY 2008 at just over $1 billion (TEC 1,078,230) (TPC 1,122,000). If the cap on total U.S. contributions to ITER is $2.4 billion, why hasn't DOE said so in the TPC estimate? Why doesn't the budget justification say that the total project cost is, in fact, $2.4 billion?

Answer. The $2.4 billion represents the pre-CD-2 (Critical Decision 2, "Approve Performance Baseline," which establishes a formal cost and schedule baseline) estimate by DOE of the total level of U.S. funding, including prior year funding, necessary to meet U.S. obligations for ITER to obtain first plasma; this figure includes our in-kind and cash contributions. This figure is not the total project cost; while first plasma does not represent total project completion, it does signify completion of machine assembly, integration, and commissioning in support of initial operations and is a major milestone.

Question 6. Race to the Top: The budget includes a one-time request of $200 million for the "Race to the Top for Energy Efficiency and Grid Modernization" initiative. This would provide grants to states to make progress toward the goal of doubling national energy productivity by 2030 by undertaking projects in five areas: efficiency (including combined heat and power, and demand response); distributed generation; customer access to data; resiliency and cyber-security; and visibility in grid operations.

> I am concerned that there are five different objectives that will complicate administration, and that these five areas do not have the same ability to affect the goal of doubling national energy productivity.

Wouldn't it be better to focus this initiative on the one-or-two objectives that have the greatest influence on energy productivity?

Would you please provide the Committee with a rough analysis of the relative influence that each of these objectives has on energy productivity?

Answer. The Race to the Top for Energy Efficiency and Grid Modernization is a challenge to states to implement effective policies that can increase energy productivity and modernize the grid. To ensure that participants have sound enabling environments for private investment, the Race to the Top establishes qualifying criteria in five policy categories, all of which support improvements in energy productivity. As proposed, applicants would qualify for the Race to the Top by meeting criteria for encouraging energy efficiency as well as their choice of three of the four remaining categories. The Race to the Top preserves the flexibility of states to develop their own portfolio of policies , including through technical assistance grants that can be used to help applicants implement policies that would qualify them to compete in the challenge.

Improvement in energy productivity and energy efficiency is the only criterion for final selection of prize winners. All of the qualifying criteria are aimed at improving conditions for private sector investment in energy productivity. For example, states

that have implemented policies to incentivize investments in grid modernization are in a better position to avoid large losses in productivity due to both manmade causes (e.g. multi-state blackouts due to human error) and natural disasters (e.g. multi-state blackouts due to storms). States with policies in place to promote investments in grid resilience are also better able to attract businesses and drive efficiency gains in the electric power sector. Similarly, states that act to enhance household and business access to data about their electricity usage are likely to be in a better position to realize the benefits of consumer choices to save energy, leveraging the considerable investments they have already made in smart meter technologies. For efficiency, a state may choose to implement a suite of policies, such as the most recent building codes and incentives, to achieve cost-effective efficiency.

These examples illustrate the integrated nature of policies that support grid modernization and energy productivity. At present, DOE does not have analysis that attempts to separate and attribute the benefits of attaining each of the qualifying criteria in energy efficiency, distributed generation, customer access to data, grid resiliency, and visibility in grid operations.

Question 7. Appliance standards: The Appliance Standards program is one of DOE's most successful programs, having reduced national electrical demand about 7 percent below what it otherwise would be. However, the Administration has missed the deadlines for standards for several appliances—delays that have cost consumers and businesses an estimated $3.4 BILLION in lost energy cost savings. Please explain the reasons for these missed deadlines, and whether the budget request will allow them to be met?

Answer. The budget allows for the timely completion of all statutory requirements of energy conservation standards and test procedures. DOE remains committed to meeting its deadlines and the budget request allows for DOE to meet these important deadlines.

Question 8. High-Performance Computing: For decades United States, through DOE management, has been the world leader in high-performance computing, but that lead is slipping quickly to other nations as competition grows in the race to build the first exascale computer. If the U.S. loses this race, industry experts believe that the impacts will trickle down more broadly to electronics industries resulting in losses in U.S. high tech competitiveness and economic growth. Congress asked the DOE to submit a plan to Congress detailing how it would manage exascale computer development and provide for "Big Data" computing, but that final report is now more than a year overdue. If confirmed, what will you do to maintain U.S. leadership in high-performance computing and how will you focus DOE efforts to win the race to exascale computing? Will you work to ensure that Congress receives this report?

Answer. In June 2013, the Department submitted a plan to Congress outlining its plan for developing exascale computing capabilities. DOE will draw upon the programmatic and technical strategies that have helped established the U.S. as the leader in innovative high performance computing (HPC) systems over the past half-century. These strategies include: Research, Development, and Engineering (RD&E) to expedite the timely development of hardware, software, and mathematical technologies; the transition or redesign of today's science and engineering simulations and large- scale data analysis tools to take advantage of exascale technology; and the acquisition, deployment, and operation of the advanced computing systems on regular timetables and with predictable budgets.

The focus of this plan is will be on the RD&E effort to deploy exascale computers that:

- provide computational capabilities that are 50 to 100 times greater than today's systems at DOE's Leadership Computing Facilities;
- have power requirements that are a factor of 10 below the 2010 industry projections for such systems which assumed incremental efficiency improvements;
- execute simulations and data analysis applications that require advanced computing capabilities;
- provide the capacity and capability needed to analyze ever-growing data streams; and
- advance the state-of-art hardware and software information security capabilities.

This plan will be executed through the National Nuclear Security Administration (NNSA) and the Office of Science (SC). Responsibilities will be shared, taking advantage of the core capabilities of the partners.

The Department's Advanced Scientific Computing Advisory Committee also recently completed a report on their study of the "Synergistic Challenges in Data-Intensive Science and Exascale Computing" that identifies research opportunities that

are most likely to positively impact both data-intensive science goals and exascale computing goals.

The Office of Science and NNSA will continue to work collaboratively on strategic research investments and partnerships between industry, the national laboratories, and U.S. research universities. These efforts are advancing development of critical technologies-both hardware and software-and ensuring that our critical applications are ready to harness the potential of exascale and Big Data computing to advanced DOE missions.

Question 9. The U.S. is one of seven participants in the development of ITER, the international fusion energy science facility located in France. Since 2006 the cost of ITER has tripled and this growing cost of the U.S. contribution is having a significant impact on DOE managed U.S. research programs, including cuts to the very programs that will benefit from ITER's development. What will be your strategy for ensuring the DOE maintains robust basic science and domestic fusion programs while continuing to meet our international commitments to ITER?

Answer. An important step to maintaining robust basic science and domestic fusion programs was the development of a funding approach for the U.S. contributions to ITER that is capped at no more than $225 million per year. The non-ITER component of the FY 2014 budget helps improve our fundamental scientific understanding of plasma physics and also ensure the U.S. can take advantage of its investments when ITER commences operations. The priorities for the non-ITER components were chosen with a vision for what will be required for the U.S. to be a leader of fusion and plasma sciences in the next decade. This budget promotes leverage through exciting partnerships with the Basic Energy Sciences and Advanced Scientific Computing Research programs, and with the National Science Foundation. The request also supports targeted partnerships overseas at facilities with capabilities the U.S. lacks. The FY 2014 plan also includes investments in vigorous research at national laboratories, universities, and private industry, supporting researchers and students who may subsequently choose to conduct research at ITER. The FY 2014 proposal will support over 240 graduate student researchers in the fusion and plasma sciences.

Question 10. The buildings sector has lagged behind appliances and manufacturing in achieving efficiency improvements. What do you see as the appropriate role, and the appropriate strategy, for DOE to improve the energy efficiency performance of the buildings sector, and as a part of your answer how would the President's goal of $2 billion efficiency retrofit investments using private capital through Energy Savings Performance Contracts (ESPCs) fit into the strategy?

Answer. The existing building stock across the country remains a largely untapped opportunity for energy savings through improved energy efficiency. The Federal government has an important role to play in establishing reliable tools that help building owners assess the efficiency of their buildings and identify cost-effective opportunities for saving energy, as well as providing best practice models for financing improvements and overcoming other barriers to improving the efficiency of buildings. Through the new Better Buildings Challenge, DOE is making progress in many of these areas. This effort includes showcasing and validating a broad set of best practices, which now includes more than 100 partners and organizations making meaningful progress towards the President's goal of making American commercial and industrial buildings at least 20 percent more energy efficient by 2020. For the Federal government, ESPCs represent a critical tool to implement energy efficiency improvements in Federal buildings and facilities with limited to no upfront capital costs to Federal agencies, and the President's Challenge is catalyzing greater use of this financing mechanism. We are currently on track to meet the President's $2 billion performance contracting goal by the end of 2013. We are also pursuing opportunities to share the lessons learned in the Federal sector with public organizations as well as others that can benefit from performance contracting.

Question 11. The Weatherization Assistance Program serves as the backbone of the residential buildings efficiency retrofit industry. This core Federal program is widely supplemented by state governments and utilities and it is a vital source of standards, best practices, and a trained workforce. However, with the exhaustion of Recovery Act funding, the budget for the program is dropping below the level needed to sustain an effective national program.

What would be your strategy for ensuring that this program continues to serve as a foundation for the residential retrofit industry?

Answer. The Department of Energy is pursuing a strategy to continue the Weatherization Assistance Program (WAP) as a foundation for the residential retrofit industry. A first step is to mitigate the detrimental impact of the funding levels provided in FY 2013 through the Continuing Resolution (CR) and sequestration. The Appropriation provided through the CR ($68 million less sequestration) is far below

historic funding levels and is insufficient to maintain the infrastructure of the WAP service delivery network. The Department was able to identify prior year unobligated balances to supplement the FY 2013 CR appropriated level, and is appreciative of Congress' approval of its reprogramming request to use these funds to sustain WAP activities.

The FY 2014 Budget request of $184 million for WAP is closer to pre-Recovery Act funding levels and is an essential step to sustain the program. In addition to requesting funding at an appropriate level to sustain the weatherization network of State and local offices and continue to provide needed weatherization services to low-income populations, the Department is investing in resources and training that will benefit the entire industry. Despite these funding difficulties, DOE will continue to focus on training for residential efficiency retrofits. The WAP will continue to certify training centers and instructors who provide the skill development of workers within the Program and the residential industry.

As in previous years, the WAP will allow states and territories to set aside a percentage of their grant funds so that skill development, training, certification, monitoring and program oversight can be performed at the grantee and subgrantee levels. The enabling legislation allows for up to 20 percent of WAP funds to be used for these training and technical assistance activities. This percentage is to ensure sufficient funding for performing these activities while maximizing weatherization production.

Question 12. The State Energy Program provides funding for each Governor to maintain an essential energy planning and policy development capability and to coordinate this capability with other States and Federal agencies. However, funding has now dropped to levels that threated their continued effectiveness. If confirmed, would you seek funding in the future to return the State Energy program to the level of funding that prevailed before the Recovery Act?

Answer. The Department of Energy's (DOE) State Energy Program assists states in establishing and implementing clean energy plans and policies, increasing competitiveness, enhancing economic development, and improving the environment. In its FY 2014 Congressional Budget Request, DOE requested $57 million to continue assisting states in reducing their energy consumption and energy costs. Although historic funding levels have varied, particularly under the Recovery Act, DOE believes $57 million in FY 2014 is the appropriate level to adequately support the SEP program. The State Energy Program looks forward to continuing to support states in their efforts in clean energy policy, planning and development.

Question 13. Dr. Moniz, a lot of air time was spent last year bashing the Department of Energy for the Solyndra loan guarantee. No one likes the idea that the U.S. Government picks technology winners and losers at the taxpayers' expense. However, the simple truth of the matter is that countries that we compete with, like China, are financing the expansion of their energy industries at our expense. Chinese government solar investments have crippled U.S. producers. China and other competitors are looking to capture what is rapidly becoming the next big energy market, to manufacture these new technologies and own the supply chains, and to reap the economic benefits of using them throughout their economies. If you are confirmed, what do you propose to help renewable and other lower-carbon energy technologies make it, not just in the U.S. marketplace, but also in the global energy market?

Answer. Our nation stands at a critical point in time in terms of the competitive opportunity in clean energy. In 2012, $268 billion was invested globally in clean energy, a 500 percent increase since 2004; trillions more will be invested in the years ahead. Last year, China pulled ahead of the U.S. in clean energy investment after we gained the investment lead in 2011. We are essentially trading pole position with China as the world begins to accelerate into the decades-long transition to clean energy. In that transition, the United States faces a stark choice: the clean energy technologies of today and tomorrow can be invented and manufactured in America, or we can surrender global leadership and import these technologies from other countries.

To help U.S. renewable and lower-carbon energy technologies excel in the global marketplace and result in economic benefit in the U.S., the Department has created the Clean Energy Manufacturing Initiative (CEMI). CEMI is a strategic integration and commitment of manufacturing efforts across the Office of Energy Efficiency and Renewable Energy (EERE), which has two overall objectives:

1. Increase U.S. competitiveness in the production of clean energy products: Strategically invest in technologies that leverage American competitive advantages and overcome competitive disadvantages, and

2. Increase U.S. manufacturing competitiveness across the board by improving energy productivity: Strategically invest in technologies and practices to enable U.S. manufacturers to increase their competitiveness through energy efficiency, including combined heat and power.

As part of this Initiative, we are undertaking several efforts to enhance U.S. manufacturing competitiveness and capture the potential of the clean energy market. One key example is the establishment of clean energy manufacturing institutes as part of the President's National Network of Manufacturing Innovation. These institutes are intended to provide researchers—especially from small and medium-sized enterprises—timely, affordable access to physical and virtual tools, and to develop and demonstrate new materials and critical processes to advance clean energy manufacturing technologies for industry and their use. The institutes were established in response to recommendations from the Advanced Manufacturing Partnership's Steering Committee and the President's Council of Advisors on Science and Technology included in their July 2012 "Report to the President on Capturing Competitive Advantage in Advanced Manufacturing."

Question 14. The lesson to me from Solyndra is that taxpayers need a lot more protections when it comes to Federal financing. There need to be safeguards to ensure that there aren't any more Solyndras. But, it is also clear to me that there is a big difference between investing in windfarm or solar project or geothermal plant that has a customer and power purchase agreement on Day 1, compared with investing in a manufacturing plant to make a commercially untested product. The financial risks to the taxpayers are simply not the same and they shouldn't all be lumped into the same loan program. When Sen. Bingaman and Sen. Murkowski held a hearing on the DOE loan guarantee program a year ago, in March 2012, I asked Herb Allison, the lead author of a review of program, whether or not the DOE loan program ought to be carved into separate financing programs based on the financial and technical risk of the projects the Government was trying to fund. He agreed that idea made sense. If you are confirmed as Secretary, what reforms would you propose for the DOE loan programs?

Answer. From the world's largest wind farm and some of the largest solar generation facilities to the first two all-electric vehicle manufacturing facilities in the United States, the Department of Energy's (DOE) Loan Programs Office (LPO) manages a broad portfolio of new and innovative energy and transportation projects. These investments are giving the United States a chance to compete and succeed in the global clean energy race.

Several recommendations were made in the report that resulted from the review you mention by former Treasury Official Herb Allison. To date, all of Mr. Allison's concerns have been or are being addressed, including filling key positions with experienced professionals, clarifying authorities, strengthening internal oversight of the programs, establishing a robust early warning system, and improving reporting to the public. LPO continuously looks for additional ways of improving its underwriting and asset monitoring activities to ensure best practices in protecting taxpayer interests.

LPO is one of the largest, most experienced project finance organizations in the world. As designed, LPO has the capabilities and tools to support a number of different project types, all while managing risk appropriately. All projects will continue to undergo rigorous technical, financial and legal due diligence by officials in the DOE loan program and their third-party advisors. Transactions are structured to identify and mitigate risk as effectively as possible before proceeding with a guarantee. Once a project closes, the LPO will continue to use powerful monitoring tools-including strong covenants in all loan guarantees and strict project milestones-to control the amount of additional risk it assumes. DOE will continue to be an active manager, continuously monitoring projects, their market environments, and other identified risks to seize all opportunities to minimize exposure to loss.

Question 15. The United States and Israel have begun developing a strong bilateral energy relationship over the last few years. The US-Israel Energy Cooperation program, established by Congress in 2008 connects DOE with Israel's Ministry of Energy and has proven an excellent catalyst to private sector cooperation between the countries. Secretary Chu sought to further this relationship through hosting Israeli energy delegations in Washington to explore new areas ripe for cooperation. Now, against the backdrop of a natural gas revolution both at home and within Israel, new opportunities present themselves to deepen our relationship, and indeed move it beyond the programmatic cooperation we've seen to a more strategic realm befitting our alliance. Do you share these views? What growth opportunities do you see for the US-Israel energy relationship? Are you committed to continuing to fund the US-Israel Energy Cooperation Program?

Answer. DOE plans to continue to develop its already strong relationship with Israel on strategic energy matters. DOE will pursue opportunities to enhance its cooperation with Israel, and we look forward to continuing to work with the Government of Israel, including the Israeli Ministry of Energy and Water Resources.

We value the role the U.S.-Israel Energy Cooperation Program has played in furthering clean energy technology research, development, and commercialization partnerships between U.S. and Israeli companies. Since the program's launch in 2009, DOE and Israel's Ministry of Energy and Water have jointly funded twelve such partnerships through the Binational Industrial Research and Development Foundation, leveraging $6.3M of DOE investment with almost $19M in Israeli government and U.S. and Israeli private sector cost-share. We are now beginning to see repayments from projects that have reached commercial success. DOE has funded the program in every year since its inception.

We are also working together with a number of Israeli government institutions on critical energy infrastructure protection, energy efficiency standards, natural gas utilization, investment in resource development and potential trade opportunities.

Question 16. Appliance efficiency standards: The Committee regularly hears about two particular concerns with the appliance standards program testing requirements. First, some equipment, such as commercial air-conditioners, have a virtual limitless combination of components, yet DOE requirements seem insensitive to the cost to manufacturers to test all of these combinations, instead of testing a subset of combinations and estimating the performance of the other combinations. Second, there seems to be a trend toward requiring manufacturers to pay for third-party testing even though Congress has directed DOE to use industry testing and certification programs where available and accurate, and OMB directs agencies "to use voluntary consensus standards in lieu of government-unique standards except where inconsistent with law or otherwise impractical". Does the budget anticipate DOE working with appliance manufacturers to find ways to reverse the trend in the increasing burden from these two DOE testing requirements?

Answer. DOE's current regulations allow for rating of commercial heating, ventilation, and air-conditioning (HVAC) equipment based on physical testing or the use of computer simulation models. For those units that manufacturers elect to test, DOE does not have any third-party testing or certification requirements; most manufacturers test their own products and do not pay for third-party testing. DOE has heard concerns from industry that some modifications to DOE's existing rating regulations should be considered to better reflect the variety of combinations and technologies currently found on the market and to help streamline the rating process for manufacturers. DOE has been receptive to these concerns and has initiated two separate efforts in response.

First, DOE is currently conducting a rulemaking (initiated in April 2011) to consider changes to its regulations governing the use of simulation methods to estimate product performance for commercial HVAC and refrigeration equipment. Second, and most importantly, DOE has initiated a negotiated rulemaking to amend the regulations regarding ratings and reporting for the commercial HVAC and refrigeration industry. DOE understands that there are many considerations and values industry input on these issues. DOE accepted nominations for the voting members of the negotiated rulemaking working group through the announcement of a Federal Register notice published in March 2013. DOE received 33 applications from which 25 voting members were selected. The certification working group is comprised of members representing 2 trade organizations, 7 commercial HVAC manufacturers, 4 commercial refrigeration manufacturers, 1 commercial heating manufacturer, 3 commercial water heating manufacturers, 3 energy-efficiency organizations, 1 government representative, 1 utility, 2 testing laboratories, and 1 independent consultant. The 25 members of the working group will vote to represent the views of all interested parties during the negotiations. The purpose of the certification working group is to undertake a negotiated rulemaking to discuss and, if possible, reach consensus on proposed certification and compliance requirements for commercial HVAC, water heaters, and refrigeration equipment, which would include rating methods, verification programs, and certification requirements. DOE's budget reflects full support for this working group in hopes of reaching a consensus-based outcome on these complex issues.

Question 17. Voluntary industry standard vs. Government standards: Regulatory issues can be addressed through voluntary commitments adopted by industry, or that could instead be addressed through mandatory regulation adopted by government. I favor non-regulatory marketplace approaches when effective in delivering results. Does this budget reflect a policy of considering less-costly, voluntary industry commitments over mandatory regulatory approaches?

Answer. The Department is required by statute to set minimum energy efficiency standards and develop test procedures for a number of residential products and commercial and industrial equipment. The Department's FY 2014 budget request represents a balanced approach that couples voluntary market partnerships with statutorily mandated energy conservation standards. Both mechanisms enable cost-effective, energy efficient technologies and techniques to penetrate the market, resulting in long-term energy and cost savings by improving the performance of homes and buildings across our nation.

Question 18. Building energy codes: DOE's role in building energy code development has been to serve as a technical advisor to the states. But DOE also publishes a list of proposed changes it wishes to see implemented in some codes, and thus advocates for specific code elements. What do you this is the appropriate role for DOE to play in standards-setting?

Answer. DOE is statutorily required to periodically review the technical and economic basis of building energy codes, as well as participate in the industry processes for their review and modification, including seeking adoption of all technologically feasible and economically justified energy efficiency measures (42 USC 6836(b)).

DOE is also directed to provide technical assistance to states to support implementation of state residential and commercial building energy efficiency codes (42 USC 6833(d)).

More information on statutory requirements and the DOE role relative to building energy codes can be found at: https://www.energycodes.gov/about/statutory-requirements.

Question 19. IECC energy building code: Studies have shown the 2012 International Energy Conservation Code, or IECC, is approximately 30-40 percent more energy efficient than the 2006 IECC. I understand that DOE considered supporting measures that included more flexibility in the code, while maintaining efficiency levels (e.g. reinstating equipment tradeoffs), but ultimately withdrew support. Does DOE support standards based on performance that will allow builders to make their own product choices?

Answer. DOE participates in industry processes to develop building energy codes and standards, such as the International Energy Conservation Code (IECC), and supports performance-based compliance options. Current provisions in the 2012 IECC target building component performance levels, and do not specify a particular product or material. For example, insulation applied in wood framed walls is based on an R-value (i.e., heat resistance rating), allowing builders to choose any material that meets the required performance level. The 2012 IECC also allows builders to install measures exceeding minimum code requirements, which can then be traded against other measures, as allowed within the code. To ensure this flexibility is available to all builders, DOE provides free automated compliance software, known as REScheck and COMcheck, through the Building Energy Codes Program website.

DOE evaluated several concepts for potential submission to the 2015 IECC, and ultimately did not submit a proposal specifically targeting the reinstatement of equipment tradeoffs. The allowance for energy to be traded between residential building envelope and mechanical systems is a concept that previously existed in the code, but was removed following the 2006 IECC via the International Code Council (ICC) code development process. In developing proposals for the 2015 IECC, DOE solicited public comments on draft code changes. Stakeholder feedback raised a number of questions on the pros and cons surrounding a reinstatement of equipment tradeoffs within the IECC. Other organizations have submitted proposals targeting whole-building energy savings and performance-based alternative compliance paths. Proposals have been submitted based on modified versions of the former equipment tradeoff. The ICC recently published a monograph containing all submitted code change proposals for the 2015 IECC (http://www.iccsafe.org/cs/codes/Pages/12-14-Proposed-Group-B.aspx). The DOE-submitted proposals for the 2015 IECC, including related analyses and public comments received, are available at https://www.energycodes.gov/development/residential/2015IECC.

Question 20. ESPCs: Energy Savings Performance Contracts are a guaranteed way for the government to save taxpayers' money and reduce the deficit by reducing energy waste in federal facilities. Because the energy savings are guaranteed by the energy service company performing the energy efficiency upgrade, there is no chance that the government will be left paying for a project that doesn't perform. The Department of Energy has completed ESPCs in 281 federal buildings since 1998, saving the Federal Government $7.2 billion dollars in cumulative energy savings. Under this budget, what does DOE plan to do to further expand the use of ESPCs?

Answer. The Department of Energy's (DOE), Federal Energy Management Program (FEMP) is embarking on a series of activities to streamline performance contracting across federal project funding programs and expand the use of performance

contracting in Federal agencies. This effort builds upon the streamlining progress made to date with the program and includes ongoing training, a new data effort, as well as a new contract standardization effort, with overall goals of making performance contracting business as usual.

A more streamlined process bolstered with better project data and personnel training will ultimately lead to Federal agencies seeking to do more projects. This is essential to meet important energy efficiency, water savings, renewable energy, and greenhouse gas goals.

Question 21. Water heaters as load management devices: Rural electric cooperatives have long operated programs that use large electric resistance water heaters to reduce system peaks, store wind and hydro energy at night, and assist in frequency control. However, DOE has rejected requests to establish a new class for water heaters used in this way. Alternatively, on February 2, 2013 DOE published a notice of proposed rulemaking on the establishment of a waiver to provide for the continued manufacture of large capacity electric water heaters for use in demand response programs. The Committee has heard concerns form electric co-ops that the proposed waiver would only be granted on an annual basis and with strict limitations, providing little certainly to manufacturers or utilities operating these programs. Will DOE continue support for demand response, and in this case of large electric water heaters, work to ensure that DOE reaches a solution that is practical and allows electric co-ops and other utilities to continue, and to expand, their water heater demand response programs?

Answer. Yes. DOE is currently reviewing all the comments received on its proposal to allow for a waiver process for demand response water heaters. DOE also met with several external stakeholders on May 3, 2013, to listen to their particular concerns regarding DOE's proposal.

Question 22. Green building certification: Some have argues that the Department's current system for identifying a green building certification system has resulted in the selection of a system that is not consensus based, and they are urging that Congress amend section 433 of EISA to require that any system selected by DOE must be an American National Standards Institute (ANSI) standard. Does the Department agree that the identification of a green building certification system should be limited to only those systems which establish ANSI standards? Please explain your reasoning.

Answer. DOE has not identified a green building certification system, nor have we adopted a system for identifying a green building certification system. We have published a proposed rule, pursuant to 42 U.S.C. 6834(a)(3)(D)(i)(III), providing criteria for identifying a certification system and level for green buildings that encourages a comprehensive and environmentally sound approach to certification of green buildings. See 75 FR 29933 (May 28, 2010). As required by statute, among the criteria in the proposed rule that a third party green building rating systems must provide is an opportunity for development and revision of the system through a consensus based process if they are to be considered for Federal agency use in meeting the proposed rule. See 42 U.S.C. 6834(a)(3)(D(iii))(III) and 75 FR at 29947. DOE notes that agencies are not required by law or any other authority to use a third party green building rating system.

DOE recognizes that ANSI accreditation can function as an indicator of the degree to which a third party green building rating system has been developed using consensus-based processes. However, the criteria we have outlined in the proposed rule are sufficient to ensure that agencies wishing to use a third party green building rating system choose only systems that incorporate consensus-based processes in their development and revision.

Responses of Daniel B. Poneman to Questions From Senator Murkowski

Question 1. Fossil Energy—The Administration and others have rightly pointed out that federal R&D spending was at least partly responsible for the development of hydraulic fracturing, which has led to record levels of oil and gas production in the United States. Yet when I look at your budget, research and development for fossil energy is cut by over $90 million. What is the rationale for deemphasizing innovative oil and gas technology when it is precisely fossil fuels that are helping revitalize American industry, boost our exports, and create jobs?

Answer. The development of innovative oil and gas technologies is being focused on ensuring that the Federal government's understanding of the risks associated with oil and gas development keeps pace with advancements in production technology and developing technologies to mitigate these risks. For example, DOE has focused on conducting research to understand and minimize environmental and safety risks associated with hydraulic fracturing, including unconventional resource

characterization, improved stimulation methods, and the treatment and handling of produced water. In addition, NETL researchers are pursuing a range of research activities including assessments that integrate evaluations of risks to water and air quality, mitigating the impacts of development, as well as addressing issues related to induced seismicity.

In addition, the President's FY2014 Budget requested funds to conduct laboratory and/or field-based research focused on increasing public understanding of methane hydrates in gas-hydrate-bearing areas. These public sector-led efforts will be designed to evaluate the occurrence, nature, and behavior of naturally-occurring gas hydrates and the resulting resource, hazard, and environmental implications.

Question 2. Oil & Gas Taxes—Once again, the budget request proposes to raise taxes on our nation's energy producers by $45 billion over the next 10 years. If the Administration is serious about an "all of the above" energy strategy and reducing our dependence on OPEC oil, please explain how eliminating these tax provisions will help achieve these goals.

Answer. The Administration believes that to foster the clean energy economy of the future and reduce the Nation's reliance on fossil fuels that contribute to climate change, it is appropriate to repeal tax provisions that preferentially benefit fossil fuel production. Oil and gas subsidies are costly to the American taxpayer and do little to reduce energy prices. Removing these inefficient subsidies would reduce greenhouse gas emissions and generate $40.7 billion of additional revenue over the next 10 years. This $40.7 billion represents only a small percentage of domestic oil and gas revenues—about one percent over the coming decade. These terminations free up resources to invest in clean energy development and production, which is critical to the Nation's long-term economic growth and competitiveness.

Question 3. DOE Funding—Please provide cumulative and year-by-year totals for all R&D spending that, since 1975, DOE has allotted to 1) shale gas, 2) safety and environmental impacts of hydraulic fracturing, 3) wind power, and 4) solar power, from the creation of the Department to the present. If the Department is unable to provide figures from the 1970s to the present, please provide figures since 1990.

Answer. It is appropriate to examine the expenditures of the Department in the context of a portfolio of investments, and criteria for those investments. Key criteria include whether a public benefit, such as reduced pollution, can be expected from the investment and the ability and motivation of the industry to make an investment on its own. The two graphs* below show the distribution of DOE's Energy R&D portfolio over the first 30 years of the Department's history. This data does not include funding from FY 2009 to the present including emergency appropriations in the American Recovery and Reinvestment Act.

Clearly each of these areas of investment can be further subdivided into projects on particular aspects, such as thin film solar or shale gas. Over the years, these projects can move between programs and accounts and can therefore be difficult to trace through history. The Department is happy to provide more detailed information on a specific funding area, or set of funding areas, below.

Question 4. Energy Spending—Collectively—across all federal programs and across all federal agencies, from DOE to the extension of energy-related tax credits—how much does the President's budget request propose to spend on clean energy in FY 2014? Cumulatively through FY 2023?

Answer. DOE does not aggregate information on clean energy spending across all federal programs and across all federal agencies. DOE's FY14 request for clean energy programs is described in the President's Budget. Estimated funding for FY 2015 through FY 2023 has not been specifically projected. We would be happy to work with your staff to answer any specific funding questions on the DOE budget.

Question 5. One of the main missions of the Office of Nuclear Energy is to support R&D of nuclear energy technologies and related fuel cycle issues. The Office's budget request reduces the funds allocated for these activities by more than $59 million, including the zeroing of the Integrated University Program budget that has been supporting scholarships and fellowship for nuclear engineering students. These are all R&D areas that I highlight and support in my Energy 20/20 energy blueprint in order to maintain strong U.S. domestic civil nuclear capabilities and our future global competitiveness. Is DOE confident that these cuts will not adversely affect the important R&D activities carried out by the Office of Nuclear Energy?

Answer. Yes, DOE is confident the reductions will not adversely affect progress on NE priorities. The budget supports higher priority work while shifting the focus away from lower priority efforts. There is tremendous potential for America to take a leadership role in the expansion of safe and sustainable nuclear energy technologies around the world. Our fiscal year 2014 budget request reflects the Presi-

*All graphs have been retained in committee files.

dent's priorities in this area—supporting the accelerated commercialization of small modular reactors, making progress on solutions to the back-end of the fuel cycle, making targeted investments in supporting the existing fleet of reactors, and maintaining our research and development infrastructure. We are committed to working closely with NSF as they develop the details of their enhanced National Graduate Research Fellowship Program (formerly the NSF Graduate Research Fellowship program) and with the National Science and Technology Council's Committee on STEM Education (CoSTEM), to help ensure the mission needs of DOE for graduate level education and training are met.

Question 6. With regard to the our international engagement with key organizations, such as the IAEA, the NEA and others, that budget for that program is being reduced from a very small allocation of around $3 million in FY 2013 to $2.5 million in FY 2014. How will this decrease impact our international engagements?

Answer. The $2.5 million requested in FY14 is appropriate and sufficient to support the Office of Nuclear Energy's important international engagement activities. Our work with organizations such as the IAEA, the NEA and the International Framework for Nuclear Energy Cooperation, will continue. On the bilateral front, we will continue to engage with priority countries. Both technical and administrative support provided by our laboratory experts to bilateral activities such as the Joint Standing Committees on Nuclear Energy Cooperation with Argentina, Brazil, Taiwan, and South Korea and coordination and integration support for collaborative fuel cycle and reactor research and development efforts with Russia, France, and others be streamlined and focused on accomplishing priority goals.

Question 7. Fossil Energy—The budget documents state that funds for the natural gas technologies program will continue to be used for R&D related to hydraulic fracturing. This is in addition to funding from the Interior Department and EPA. Given scarce federal resources, coordinated efforts are important. Please describe DOE's work on this issue and how this relates to the work being done by other federal agencies with regard to hydraulic fracturing.

Answer. The tri-agency research plan is still under development. The work to date to develop the plan has been very helpful in both coordinating the research efforts of the three agencies and developing the President's FY 2014 Budget Request. The Department's work in this area has focused on developing technologies and best practices to address safety and environmental issues associated with hydraulic fracturing.

DOE, the Environmental Protection Agency (EPA), and the United States Geological Survey (USGS) will collaborate on research that improves our understanding of the impacts of developing our Nation's unconventional natural gas resources, and ensure that these resources are developed in a safe and environmentally sustainable manner. Through enhanced cooperation, the agencies will maximize the quality and relevance of this research, enhance synergies between the agencies' areas of expertise, and eliminate redundancy.

Question 8. Geothermal Power—As you know, my home state of Alaska has vast geothermal power resources so I am a strong supporter of Enhanced Geothermal Systems Research. In the FY 2014 budget request, the Department seeks a $23 million increase to $60 million for geothermal activities. Please describe the work DOE proposes to do with the additional geothermal funding. In addition to EGS, will you also fund work related to heat pumps? Will DOE perform work designed to reduce the risk and cost of geothermal well drilling? Will DOE perform work to better utilizing geothermal cooling and heating in commercial buildings and homes?

Answer. The Department's request for an additional $23 million is to expand our efforts to research, develop, and ultimately deploy Enhanced Geothermal Systems (EGS). Specifically, the proposed funding increase will allow the EGS subprogram to conduct selection and preparation of an EGS Field Lab, which aims to achieve the following:

- Promote transformative, high-risk science and engineering that will create a commercial pathway to EGS adoption. EGS technologies would allow us to tap geothermal resources—upwards of 100+ GWe, or enough to power 100 million homes—that would be otherwise inaccessible; and would increase the reach of geothermal development in the U.S. beyond primarily the western states.
- A key distinction between existing private-sector led, DOE-funded demonstration projects and the proposed DOE-managed EGS Field Lab, is the DOE's ability to develop, test, and comprehensively monitor an engineered reservoir at a scale and integrity that has not yet been demonstrated, using new technologies in pre-commercial stages of development. The EGS Field Lab effort will pave the way to rigorous and reproducible approaches to EGS that will significantly reduce industry development risk.

- FY14 funds for the EGS Field Lab will be used for the selection of the EGS Field Lab site and an independent operator responsible for field implementation; initiation of the permitting process and any additional required regulatory steps; and initial site instrumentation for baseline data collection. This major initiative is an integral part of the subprogram's strategy to facilitate commercialization of EGS technology.

DOE's funding request also targets efforts to reduce the risk and cost of geothermal well drilling:

- The EGS sub-program will address drilling in two areas: 1) the proposed EGS Field Lab will conduct cutting-edge research to reduce the risk and cost of geothermal well drilling, among other activities; and 2) A proposed FY14 EGS R&D funding announcement would include field scale R&D on new drilling technologies and techniques to address challenges in the high-temperature, hard-rock environments typical of geothermal reservoirs.
- The Innovative Exploration Technologies sub-program will aim in FY14 to fund competitively- selected projects that collect new data and/or apply new analysis methods to indicate geothermal favorability, which would improve drilling success rates and thereby reduce the risk and cost of drilling. Drilling fewer unsuccessful wells has a direct impact on project economics. DOE considers improving the likelihood of finding commercial geothermal fields to be a key activity of the program.

With regard to work to better utilize geothermal cooling and heating in commercial buildings and homes, we consider the EGS and Innovative Exploration Technologies portfolios to have large potential impacts in this area; for example, improved exploration analysis will allow better identification and quantification of geothermal potential throughout the country, including in non-traditional geothermal settings, and the EGS Field Lab and R&D portfolios offer the real potential to determine ways in which to make deep geothermal viable for both new power generation, and for direct use applications.

Question 9. Renewable Energy—One prominently featured in the President's FY 2014 proposed budget is a "doubling of renewable electricity production from wind, solar and geothermal by 2020." Why were these three forms of renewable electricity the only selected? How does the administration plan to achieve this doubling, and what is the ultimate goal for wind, solar and geothermal, as a percentage of total renewable electricity? According to EIA's 2012 data, wind, solar and geothermal generate about 4 percent of electricity in the U.S. Is the the goal therefore to generate 9 percent of U.S. electricity from these three sources?

Answer. The goal to double renewable electricity from wind, solar, and geothermal resources by 2020 is based on electricity production and not based on the fraction of electricity production from these resources relative to electricity production from all energy resources. At the end of 2008, EIA reports electricity production from wind, solar and geothermal resources at 72 billion kWh. The first doubling goal, reached in early 2012, is 144 billion kWh; and subsequently, the second doubling goal is 288 billion kWh. The EIA AEO 2013 reference case projects total electricity production from all energy resources at 4,389 billion kWh in 2020. While the exact percentage reached will vary based on electricity demand in this future year; wind, solar, and geothermal resources would contribute 7 percent of total electricity production from all sources, if the second doubling goal is reached in 2020 and the EIA AEO 2013 projected value for total electricity production is realized.

To meet the proximal goal of doubling renewables by 2020, the administration has implemented and proposed a number of mechanisms:[1]

1. The Section 1603 renewable energy grant program under the Recovery Act was an essential tool in deploying renewable energy resources in the U.S., successfully increasing U.S. manufacturing and supporting tens of thousands of new jobs for Americans.
2. Clean Energy R&D through institutions such as ARPA-E and Energy Innovation Hubs have invested in several cutting-edge projects in areas ranging from smart grid technology to battery improvements, which can help support increased deployment of renewables. EERE's contributions to research and de-

[1] Blueprint for a Secure Energy Future (2011); The Blueprint for a Secure Energy Future Progress Report (2012); Fact Sheet: President Obama's Blueprint for a Clean and Secure Energy Future (2013; http://www.whitehouse.gov/the-press-office/2013/03/15/fact-sheet-president-obamas-blueprint-clean-and-secure- energy-future)

velop of renewable energy technologies have resulted in significant decreases in price (e.g. U.S. photovoltaic system prices declined 48 percent from 1998 to 2011) and increases in deployment (e.g. PV installations increased twenty-fold between January 2008 and January 2013).

3. Promotion of renewable energy in rural America through the USDA Rural Utilities Service has funded over 240MW of renewable energy projects.

4. Permitting clean energy on America's public lands led to 10,000 MW of additional renewable generation capacity thanks to permitting efforts by the Department of Interior, a process which continues to become more robust.

5. Permitting of offshore areas through the Department of the Interior's "Smart from the Start" initiative has facilitated the pending construction of the Cape Wind offshore wind project and paved the way for additional offshore wind development in the Atlantic in the coming years.

6. Making the energy Production Tax Credit permanent and refundable will provide incentive and certainty for investments in new clean energy. 7. Ultimately, the creation of a Clean Energy Standard which would double the share of electricity from clean energy sources to 80 percent by 2035 from a wide variety of clean energy sources, including renewable energy sources like wind, solar, biomass, and hydropower; nuclear power; efficient natural gas; and coal with CCS. Creation of a domestic market for innovative clean energy technologies will unleash the ingenuity of our entrepreneurs and ensure that America leads the world in clean energy.

Question 10. Renewable Energy Deployment Grants—Back in 2007 Congress passed two provisions that I sponsored in the Energy Independence and Security Act—section 803 for all renewables and section 625 for geothermal projects in high-cost areas—that provided grants of up to 50 percent of aid in the actual construction of renewable energy projects. Given the Administration's interest in promoting low-carbon energy production, why hasn't the Department ever sought funding for either of these two programs?

Answer. Section 803, titled "Renewable Energy Deployment," of the Energy Independence and Security Act (EISA) allows 50:50 cost share of renewable energy construction grants. To date, the Department has not requested funding for Section 803. In alignment with mission, the Department believes that investment in research and development will provide the maximum rate of return on taxpayer investment as compared to more expensive, location-specific demonstration and deployment projects. For instance, EERE's total FY 2014 budget request for renewable electricity is $616 million. Even if this amount were matched by private cost share, it would be dwarfed in comparison to what is invested in building renewable energy projects with other policy incentives. However, the Department will look to sponsor, when appropriate, demonstration projects where applying this authority to validate new technology performance and economics in high cost areas could spur follow-on private investment and be replicated at scale.

Some of the other Federal government incentives and financing opportunities for commercializing new technologies and for constructing renewable energy plants include the DOE and USDA loan guarantee programs, Modified Accelerated Cost Recovery System depreciation schedule, production and investment tax credits and the Treasury Section 1603 grants in lieu of tax credit program. For example, under the American Recovery and Reinvestment Act, the Section 1603 Treasury grant program has incentivized over 77,000 projects yielding over 27 GW of renewable energy capacity when complete and $63 billion in total renewable energy investment by the government and private sectors. As the Treasury grant program and tax credits expire, DOE looks forward to working with Congress and other government agencies to determine the best policy mechanisms and existing authorities to incentivize private investment in building new renewable energy projects.

Question 11. Vehicle Spending—Please list the total funding requested within the President's FY 2014 budget for each of the following vehicle technologies. Please include (but also distinguish between) all funding requested by DOE as well as other federal departments:

a. Electric vehicles (including batteries and electric drive components)
b. Fuel cell vehicles
c. Natural gas vehicles
d. Other vehicle technologies
e. All vehicle technologies (combined total)

Answer. DOE does not aggregate information on vehicle technologies spending across all federal programs and across all federal agencies. The President's FY 2014 budget request for Energy Efficiency and Renewable Energy (EERE) includes funds

for the Vehicle Technologies Program (total request: $575 million) and the Fuel Cell Technologies Program (total request: $100 million). Funds requested for EERE for the specific categories mentioned above are as follows:

a. Electric vehicles (including batteries and electric drive components): $240.2 million (within Vehicle Technologies—$170.5 million for Battery/Energy Storage, $69.7 million for Advanced Power Electronics and Electric Motors R&D). It should be noted that work under "other vehicle technologies" (item d below), such as lightweight materials, support vehicles of all types, including electric vehicles. In addition, within the $118.8 million budget request for Vehicle Technologies Program's Outreach, Deployment and Analysis/Vehicle Technologies Deployment, $90 million will support new Alternative Fuel Vehicle Community Partner projects and $10 million will support a new Clean Cities funding opportunity. For both of these deployment efforts, competitively awarded projects with local communities and partners will deploy multiple fuels and technologies. Although it is expected that some projects will include electric vehicles, DOE does not predetermine the level of available funding for each vehicle or fuel type. The amount of funding will depend on the proposals submitted and projects selected for award on a competitive basis.

b. Fuel cell vehicles: $45 million (within Hydrogen and Fuel Cell Technologies—primarily supports R&D of fuel cell technologies for automotive applications, cross-cutting activities such as codes and standards, and demonstration efforts to validate technology advances). The total Hydrogen and Fuel Cell Technologies budget request is $100 million, which includes R&D for hydrogen production, delivery, storage, and early market applications.

c. Natural gas vehicles: Natural gas vehicles are supported under the Vehicle Technologies Program's Outreach, Deployment and Analysis/Vehicle Technologies Deployment activity. Within the $118.8 million budget request for Vehicle Technologies Deployment, $90 million will support new Alternative Fuel Vehicle Community Partner projects and $10 million will support a new Clean Cities funding opportunity. For both of these deployment efforts, competitively awarded projects with local communities and partners will deploy multiple fuels and technologies. Although it is expected that some projects will include natural gas vehicles, DOE does not predetermine the level of available funding for each vehicle or fuel type. The amount of funding will depend on the proposals submitted and projects selected for award on a competitive basis.

d. Other vehicle technologies: Additional Vehicle Technologies Program activities include $70 million for Vehicles and Systems Simulation & Testing, $59.5 million for Advanced Combustion Engine R&D, $59.5 million for Materials Technologies, $17.5 million for Fuel and Lubricant Technologies, and $26.3 million for other Outreach, Deployment and Analysis activities.

e. All vehicle technologies (combined total): $620 million (includes all activities noted above).

Question 12. Vehicle Infrastructure—How much of the Department's vehicle-related spending request would be applied to infrastructure R&D? Please describe these activities. Please include a total dollar amount and a percentage of overall spending.

Answer. Within Energy Efficiency and Renewable Energy, FY 2014 funding for vehicle-related infrastructure R&D is requested under the Vehicle Technologies Program/Vehicle and Systems Simulation & Testing (VSST) Subprogram to support the following:

- Approximately $1.2 million in the Lab & Field Evaluation activity for data collection and analysis from deployed electric vehicle (EV) charging infrastructure.
- Approximately $3.1 million in the Codes & Standards activity for support of the development of codes and standards that govern EV/grid communications, interoperability, and the interface between vehicles and charging infrastructure.
- Approximately $1.2 million in the Vehicle Systems Optimization activity to investigate enabling technologies such as fast-charging and wireless charging technologies.
- $20.0 million for the Grid Integration Initiative.

The total funding for these activities is approximately $25.5 million or approximately 36 percent of the $70 million request for VSST (4 percent of the total request for Vehicle Technologies).

Question 13. EV Grand Everywhere Challenge—

a. How much finding is being requested for the activities within this initiative?
b. Why is the challenge focused on one technology, with others excluded?

c. Please describe the Department's intended spending on batteries for electric vehicles under the FY 2014 request. What percentage of total funding would be allocated to lithium-ion batteries, versus alternative chemistries?

d. Please provide an update on the President's previous goal of 1 million electric vehicles on the road by 2015. Does the administration continue to believe that goal is achievable?

Answer a. In FY 2014, the Energy Efficiency and Renewable Energy budget request for the Vehicle Technologies Program includes approximately $325.6 million for work that supports the EV Everywhere Grand Challenge. This includes $240.2 million for Batteries and Electric Drive Technology, $32.9 million for Vehicle and Systems Simulation & Testing, and $52.5 million for Materials Technology.

b. The EV Everywhere Grand Challenge is but one element in the Administration's "all-of- the-above" approach to energy—EERE's broader, overall R&D portfolio includes multiple vehicle technologies, such as advanced combustion engines, natural gas and alternative fuels, and hydrogen fuel cells, as well as electric drive batteries and vehicles. The Department's Quadrennial Technology Review identified vehicle electrification as an essential part of the nation's transportation energy strategy, and the automotive industry is already moving in this direction. The EV Everywhere Grand Challenge helps focus, coordinate, and leverage vehicle electrification activities within EERE. It is also important to note that within the EV Everywhere Grand Challenge, there are many technologies being developed—such as lightweight materials and advanced climate control—that are directly applicable to both conventional and alternative vehicles.

c. Within the Vehicle Technologies Program, the FY 2014 battery R&D activity will focus on developing technologies to reduce battery costs from their current $500/kWh to $125/kWh by 2022. In addition, funds will support vehicle design optimization and performance improvements such as reducing battery size and weight.

Current lithium ion battery technology is far from its theoretical energy density limit, and with advances in lithium ion technology, there is a near-term opportunity to more than double the battery pack energy density from 100 Wh/kg to 250 Wh/kg. Specific technologies of interest include (but are not limited to) second generation lithium ion batteries with high voltage (5V) and/or high capacity (>300mAh/g) cathode materials, third generation lithium ion batteries with advanced metal alloy and composite anodes such as silicon carbon (which offer 2-4 times the capacity as today's graphite anodes), and high voltage and solid polymer composite electrolytes. FY 2014 funds will further expand battery research in beyond-lithium-ion technologies such as solid-state (lithium metal with solid electrolytes), lithium sulfur batteries, and lithium air batteries, all of which promise energy densities two to five times that of traditional lithium ion. Research will focus on overcoming challenges related to cycle life, power density, energy efficiency, and other critical performance parameters that currently stand in the way of commercial introduction. Breakthrough innovation at a reduced cost will be required for these new battery technologies to enter the PEV market. In addition, FY 2014 funds would support an Incubator activity, through which DOE will partner with businesses and researchers to bring new and impactful, "off-roadmap" technologies into the EERE battery portfolio.

In FY 2013, the split between lithium ion and non-lithium ion technologies is 90 percent to 10 percent, respectively. In FY 2014, the percentage of non-lithium-ion work would increase slightly, due to a planned competitive funding opportunity announcement for projects in this area. Until the projects are proposed and selected, however, it is impossible to provide a definitive split.

It should be noted that Vehicle Technologies' beyond-lithium work is coordinated with and complemented by other investments in beyond-lithium technologies across the Department, including the Energy Storage Hub and Energy Frontier Research Centers in the Office of Science as well as related work in ARPA-E.

d. The goal of being the first country in the world to have one million electric vehicles on the road by 2015 is an ambitious milestone on the path to the many millions of electric drive vehicles needed to move U.S. transportation away from dependence on oil. Whether or not we reach one million vehicles by 2015 is less important than maintaining the growth trend of the plug-in electric vehicle (PEV) market.

Although initially slower than projected, the PEV market is growing quickly. U.S. PEV sales increased by 200 percent in 2012 and are climbing at a faster rate after introduction relative to hybrid electric vehicles over a comparable span of time after their introduction . . . A PEV beat all other vehicle models in Consumer Reports' owner satisfaction survey for the second time (Chevrolet Volt), and PEVs have won critical acclaim with awards such as 2011 World Car of the Year (Nissan Leaf), 2013

Motor Trend Car of the Year (Tesla Model S) and 2012 Green Car Vision Award Winner (Ford C-MAX Energi).

The number of vehicle models available is on the rise—fifteen new hybrid, plug-in hybrid, and all-electric vehicles are expected in model year 2013 and 2014 from a number of manufacturers. Improved performance and a broader range of choices of these cars will encourage additional purchases as more consumers and businesses find PEVs that match their needs and budgets. Driving on electricity is cheaper than driving on gasoline—roughly comparable to $1 per gallon of gasoline equivalent—and the next generation will bring even bigger savings.

It will take the adoption of many millions of electric vehicles by consumers to truly transform our transportation sector and significantly reduce our dependence on petroleum. As such, we need to continue to pursue the research and development needed to further reduce cost and improve performance—key aspects of the EV Everywhere Grand Challenge.

Question 14. Hydrogen + Fuel Cells—This is one of just two accounts that are cut within the EERE budget, which grows by nearly 56 percent overall. Please explain why it is appropriate for the hydrogen and fuel cells budget to be reduced—especially while the larger vehicle technologies program budget request increases by more than $250 million, largely for electric vehicles that are already being sold commercially.

Answer. The fiscal year 2014 budget request for hydrogen and fuel cell technologies reflects the sustained commitment by EERE for hydrogen and fuel cells with a budget of $100 million. The Department recognizes that hydrogen from renewable or carbon-free resources will deliver the maximum benefit in terms of greenhouse gas reductions. Funding in 2014 includes activities to address the critical challenge of low cost hydrogen, focusing on renewable and low-carbon technologies. In addition, activities in Vehicle Technologies such as light-weighting and batteries will also be beneficial for fuel cell electric vehicles.

Question 15. ATVM Program—

Question 15a. How many applications are currently pending for the ATVM direct loan program?

Answer. 15a. There are currently no ATVM loan program applications pending.

Question 15b. How many of those applications are in active review?

Answer. 15b. There are currently no ATVM loan program applications in active review.

Question 15c. How many applications does the Department anticipate completing before the end of FY 2013?

Answer. 15c. While it is possible the Department may receive an application this fiscal year, at this time the Department does not anticipate completing any ATVM loan applications that might yet be received by the end of FY 2013.

Question 15d. How do the requirements of current CAFE standards compare to the baseline standards that DOE uses to determine eligibility for loans under this program?

Answer 15d. In the ATVM program, in order for a vehicle manufacture to be an eligible applicant, the adjusted average fuel economy of its light duty fleet in the most recent model year, must be equal to or greater than their 2005 (base-year) average and in order for a vehicle manufacturer's project to be eligible, the vehicle which is the subject of the application must be an "Advanced Technology Vehicle"; meaning the vehicle meets or exceeds 125 percent of the 2005 (base-year) average fuel economy for vehicles with substantially similar attributes. These substantially similar attributes are based on attributes such as EPA vehicle class, interior passenger & cargo volume, and power to weight ratio. The metric for fuel economy that ATVM uses to determine eligibility ensures that the manufacturer's corporate average fuel economy performance will exceed the light duty CAFE standards.

Question 15e. Please provide a detailed explanation of the spending of funds appropriated to this program in FY 2012.

Answer. 15e. The ATVM program was appropriated $6 million in FY 2012. Below is a table detailing LPO spending to date for the ATVM program, broken out according to the Programs' divisions:

Division	TOTAL
Credit	$ -
Portfolio Management	$ 1,643,090.62
Operations	$ 528,021.97
Legal	$ 686,097.16
Executive Director	$ 146,340.32
Origination	$ 1,993,793.78
Technical & Project Management	$ 435,323.76
TOTAL	$ 5,432,667.61

Question 15f. Please provide a detailed justification for the $6 million requested for this program for FY 2014.

Answer. 15f. Please see the FY 2014 Congressional Justification. Administrative expenses are expected to be largely consistent with FY 2012 actuals.

Question 15g. Please describe any legislative improvements the administration believes are appropriate for this program.

Answer. 15g. The Department is unaware of any Administration legislative proposals regarding the ATVM program authorities.

Question 15h. Does the administration continue to believe that the auto industry should have its own, exclusive federal loan program?

Answer. 15h. As the Loan Programs Office is not a policy making program, it has not formed a view on this topic.

Question 16. Smart Grid—The FY 2014 proposed budget calls for a 37.9 percent decrease from FY 2012 funding levels. Have all the stimulus funds targeted for Smart Grid been expended? The budget documents note that the funding will be used, among other purposes, for "Smart Grid standards and protocols for increased interoperability." Please explain. Are these the smart grid interoperability standards called for by Congress in the 2007 Energy Independence and Security Act? Has the Department compiled a comprehensive report on the results of the Smart Grid activities undertaken as a result of the Stimulus Act? If so, please provide it. If not, does it plan to do so?

Answer. As of the end of April 2013, $3.7 billion (82 percent) of the $4.5 billion that was provided for Electricity Delivery and Energy Reliability by the American Recovery and Reinvestment Act (ARRA) have been expended. For the Smart Grid Investment Grant and Smart Grid Demonstration Programs, a total of nearly $3.5 billion in payments have been awarded to funding recipients to date. This amount represents 83 percent of the $4.2 billion in funds allocated to these two programs. The ARRA-funded projects are on track to complete and expend funds by FY 2015.

The Department's FY 2014 budget request includes funds for the "smart grid standards and protocols for increased interoperability," which will be used to develop test protocols and conduct pre-standard testing on interoperable interconnection standards for distributed energy resources (DER). The DER interconnection standards are a major component of the smart grid interoperability standards stipulated in the 2007 Energy Independence and Security Act (EISA). DOE funding will directly support needs identified by the DER Interconnection Standards Subgroup under the industry-led Smart Grid Interoperability Panel, which was established pursuant to EISA.

In addition, the Department is working closely with the recipients of ARRA funding to determine the impacts and benefits of the smart grid technologies that are being deployed, which will inform the industry, its regulators and other stakeholders. These efforts will continue through FY 2015 as the technology is deployed and tested. To date, six DOE reports have been issued and may be found at www.energy.gov/OE and www.smartgrid.gov. They are:

- "Demand Reductions from the Application of Advanced Metering Infrastructure, pricing Programs and Customer-Based Systems—Initial Results," (December 2012),
- "Operations and Maintenance Savings from Advanced Metering Infrastructure," (December 2012),
- "Reliability Improvements from the Application of Distribution Automation Technologies—Initial Results," (December 2012),
- "Application of Automated Controls for Voltage and Reactive Power Management." (December 2012),
- "Smart Grid Investment Grant Program, Progress Report," (July 2012), and
- "Economic Impact of Recovery Act Investments in the Smart Grid," (April 2013)

DOE plans to issue additional reports that more fully describe the application, costs, and benefits of the technology, as well as the progress being made in these programs. In addition, DOE will issue reports that examine the factors affecting the enrollment, response, and retention of consumers in programs applying dynamic prices to their customers. The recipients involved in these consumer behavior studies are also issuing their respective reports, which are being posted on http://www.smartgrid.gov.

Question 17. Electricity Systems Hub—the FY 2014 budget request seeks to establish a new $20 million Electricity Systems Hub to address "fundamental science, technology, economic, and policy issues that affect our ability to achieve a seamless and modernized grid." Is this type of research already being performed by the federal government? Why is a new hub necessary?

Answer. The Electricity Systems Hub will address the science, technology, economic, and policy issues located at the critical interface between transmission and distribution. This nexus of power flows, information flows, markets, and regulation will need to be made seamless to accelerate grid modernization. For example, customers with microgrids or distributed resources will not be able to participate in wholesale markets for electricity or services without new technologies, transactions, and regulations that ensure equity, safety, and system reliability.

While the Federal government has undertaken some research looking at aspects of these issues, the integrated nature of the grid necessitates a multidisciplinary, holistic perspective to effectively develop solutions. Regional diversity in resources, markets, and policies also presents unique challenges that are best addressed through an integrated systems approach. A concerted effort at the Hub will enable many grid activities at the Department to come to a focal point and provide a platform for demonstrating and testing new technologies and concepts.

Question 18. National Electricity Delivery—the FY 2014 budget calls for $6 million for this office (previously called the Permitting, Siting, and Analysis Program) and notes that in FY 2014, NED plans to "streamline siting of transmission facilities on Federal lands by leading the development of a pre- application process to encourage early coordination between Federal agencies and potential applicants." How does this new initiative differ than previous attempts by this Administration to streamline transmission siting on Federal lands?

Answer. The FY 2014 budget request for the National Electricity Delivery program (NED) is not for any new initiative; rather, the budget request supports ongoing activities, which include a multi-year effort by the Department to comply with existing obligations under Section 1221(a) of the Energy Policy Act of 2005 and Section 216 to the Federal Power Act (FPA). Specifically, Section 216(h) of the FPA directs DOE to coordinate all applicable Federal authorizations and related environmental reviews required for siting an electric transmission on Federal lands. NED's on-going efforts to promote and systematically address coordination on transmission permitting and review processes support a goal to avoid duplicative Federal reviews, and provide a transparent, consistent, and predictable path for both project sponsors and affected communities.

To date, NED has been engaged in a number of activities intended to facilitate improvements to the review and siting coordination across the Federal government. In FY 2010, NED initiated efforts to streamline the permitting process for new electric transmission systems on Federal lands with the development and execution of a 9-agency Memorandum of Understanding (MOU) that establishes a framework for early Federal cooperation to expedite and simplify building of transmission lines on Federal lands. The 2009 MOU canbe found at: http://energy.gov/oe/downloads/memorandum-understanding-regarding-coordination-federal-agency-review-electric. In December 2011, NED also published a rule to implement the 2009 interagency MOU.

Further, as a part of this interagency collaboration, DOE was charged with creating an online dashboard to track the permitting status of transmission projects under the auspices of the 2009 MOU. In response, NED facilitated the development

of, and continues to maintain, a publicly-available website to track all critical elements in the Federal review process for qualifying transmission projects. This online dashboard serves as a publicly-available database containing pertinent project information, including but not limited to the physical aspects of the proposed line, lead agency information, required permits, and project schedules. This online tracking tool can be found at: http://trackingsystem.nisc-llc.com/etrans/utility/Search.seam.

Many improvements have been achieved through the 2009 MOU and DOE's December 2011 final rule,. The FY 2014 budget request provides the necessary support for NED to continue to act as the Departmental lead for the purposes of coordinating and tracking these authorizations, including activities to revise and refine regulations that directly support streamlined reviews and determinations for entities seeking permits, special use authorizations, certifications, opinions, or other approvals required under Federal law to site electric transmission facilities.

Question 19. Cybersecurity for Energy Delivery Systems—the Department seeks a 31 percent increase for its cybersecurity efforts and notes that its request seeks "to help the energy sector cost effectively manage cybersecurity risks to increase the resiliency of the energy systems." Please explain and highlight how utility costs for cybersecurity efforts are factored in for consideration.

Answer. While Cybersecurity for Energy Delivery (CEDS) program in the Department's Office of Electricity Delivery and Energy Reliability (OE) eases the transition to practice of cybersecurity capabilities by decreasing up-front R&D costs, most importantly OE engages energy sector cyber-asset vendors and utility end users at the very beginning of R&D projects so that the developed capability respects the cost constraints that utilities must accommodate throughout installation, operation and maintenance. The capability must be cost effective—otherwise it would not successfully transition to practice in the energy sector, which is the ultimate goal of all OE-funded R&D efforts.

The funding increase will advance cyber risk analysis and information sharing capabilities. This includes expansion of the Electricity Subsector Cybersecurity Capabilities Maturity Model to include the Oil and Natural Gas Subsector in an effort to engage more energy sector participants through facilitated self assessments, and to continue to work with industry to implement a framework for the analysis and appropriate sharing of assessment results to create cybersecurity capability benchmarks. OE is working to manage and reduce the risk of energy disruptions due to cyber attacks which includes the need to keep costs low for utilities seeking to improve their cybersecurity posture.

Question 20. PMAs—In its FY 2014 budget request materials, DOE notes that the four Power Marketing administrations "sell electricity primarily generated by federally owned hydropower projects," giving preference to public entities and electric cooperatives. The budget highlight materials further note on page 54 that "The PMAs also facilitate the Department's efforts to transform the Nation's energy system and secure U.S. leadership in clean energy technologies in promoting the development of higher capacity, more expansive U.S. energy infrastructure to support the development and delivery of renewable resources." Please provide the legal justification for this assertion. Does DOE expect the PMA preference customers to pay for its efforts "to transform the Nation's energy system and secure U.S. leadership in clean energy technologies"? If not, how does the Department propose to fund such an effort?

Answer. The language identified above is a quote taken from DOE's 2011 Strategic Plan. The PMAs "facilitate" the Department's efforts in the sense that they are complementary to broader DOE strategic goals. Specifically, the PMAs are maintaining and modernizing its facilities and partnering with industry to expand transmission infrastructure to ensure flexible and reliable operations—which as indicated in the budget highlight materials—accommodate industry change, interconnections and increasing interest in renewable resources as well as help deliver sources of renewable energy. These actions are consistent with the statutory obligation of the PMAs to market federal hydropower to their customers at the lowest possible cost consistent with sound business principles.

Question 21. Advanced Manufacturing—The Advanced Manufacturing Office, formerly known as the Industrial Technologies Program, receives about a 224 percent increase in funding over FY 2012 levels (from $112 million to $364 million). Please detail why such an increase has been proposed and what authorities will be used to fulfill the mission of the new Advanced Manufacturing Office.

Answer. The increased funding for AMO will support the U.S. manufacturing industry's efforts to compete and will focus on three main applied research, development, and deployment efforts that:

- Invest in research and development (R&D) projects focused on foundational manufacturing processes and materials. These projects will address core technical issues for foundational technologies that will potentially enable U.S. manufacturers to realize significant gains in energy productivity, environmental performance, product yield, and economic growth.
- Support the establishment of approximately three clean energy manufacturing innovation institutes to help bridge the gap between research and development and the marketplace. The institutes are intended to provide researchers from small and medium-sized enterprises, as well as larger businesses, timely, affordable access to physical and virtual tools, and to develop and demonstrate new materials and critical processes to advance the use of clean energy manufacturing technologies for industry. DOE is planning to invest between approximately $70M and $120M into each of these Institutes over the next 5 to 7 years, depending upon the magnitude of the opportunity, maturity, and capital intensity of the technology; scope of the focus area; and degree of non-Federal cost-sharing above a 1:1 ratio. DOE plans to fully fund each of these Institutes up front, depending on the availability of funds and quality of the proposals. These Institutes are in response to recommendations from the Advanced Manufacturing Partnership's Steering Committee and the President's Council of Advisors on Science and Technology, as set forth in their July 2012 "Report to the President on Capturing Competitive Advantage in Advanced Manufacturing." The recommendations include creating a fertile environment for innovation through robust support for basic research; increasing funding for the research and development of top cross-cutting technologies that are vital to advanced manufacturing; establishing a network of Manufacturing Innovation Institutes (MIIs) as a public-private partnership to foster regional ecosystems in advanced manufacturing technologies, particularly for the more than 300,000 small and medium-sized enterprises, which often lack adequate technical resources; deepening university and industry collaboration; building excitement for and interest in manufacturing careers; and developing a high-skilled workforce through hands-on "training centers" and course development for universities and community colleges.
- Increase efforts to work with industry to facilitate the adoption of technologies through technical assistance for industry that provides them with the information and tools to support adopting these advanced energy efficiency technologies in their existing facilities.

Generally, the following public laws have been cited providing authorization for Advanced Manufacturing Office (AMO) activities..

- P.L. 95-91, "U.S. Department of Energy Organization Act" (1977)
- P.L. 102-486, "Energy Policy Act of 1992"
- P.L. 109-58, "Energy Policy Act of 1995"
- P.L. 110-140, "Energy Independence and Security Act of 2007"
- PL-112-210, "American Energy Manufacturing Technical Corrections Act" (2012)

Specific provisions, with the corresponding U.S. Code citation are provided below along with any applicable time limitation. Excerpts of the statutes are also provided for additional reference:

- 42 USC § 17111(b)—The Secretary shall establish a program under which the Secretary, in cooperation with energy-intensive industries[2] and national industry trade associations representing the energy-intensive industries, shall support, research, develop, and promote the use of new materials processes, technologies, and techniques to optimize energy efficiency and the economic competitiveness of the United States industrial and commercial sectors.
- 42 USC § 17111(c)(1)—As part of the program, the Secretary shall establish energy efficiency partnerships between the Secretary and eligible entities to conduct research on, develop, and demonstrate new processes, technologies, and operating practices and techniques to significantly improve the energy efficiency of equipment and processes used by energy-intensive industries . . .
- P.L. 112-210, Section 7(b)(2)—The Secretary, in coordination with the industrial sector and other stakeholders, shall conduct a study of the following: (A) The

[2] For the purpose of this provision "energy-intensive industries" is defined as an industry that uses significant quantities of energy as part of its primary economic activities, including—information technology, consumer product manufacturing, food processing, materials manufacturers, and other energy-intensive industries, as determined by the Secretary. (See, 42 USC 17111(a))

legal, regulatory, and economic barriers to the deployment of industrial energy efficiency in all electricity markets[.]42 USC § 17111(e)—The Secretary shall provide funding to institutions of higher education-based industrial research and assessment centers, whose purpose shall be-(1) to identify opportunities for optimizing energy efficiency and environmental performance; (2) to promote applications of emerging concepts and technologies in small- and medium-sized manufacturers; (3) to promote research and development for the use of alternative energy sources to supply heat, power, and new feedstocks for energy-intensive industries; (4) to coordinate with appropriate Federal and State research offices, and provide a clearinghouse for industrial process and energy efficiency technical assistance resources; and (5) to coordinate with State-accredited technical training centers and community colleges, while ensuring appropriate services to all regions of the United States.

- 42 USC § 15811(b)—The Secretary may enter into voluntary agreements with one or more persons in industrial sectors that consume significant quantities of primary energy for each unit of physical output to reduce the energy intensity of the production activities of the persons.
- 42 USC § 13501(a)—The Secretary shall establish a 5-year National Advanced Materials Program. Such program shall foster the commercialization of techniques for processing, synthesizing, fabricating, and manufacturing advanced materials and associated components.
- 42 USC § 13502(a)—The Secretary shall establish a 5-year National Advanced Manufacturing Technologies Program . . . Such program shall foster the commercialization of advanced manufacturing technologies to improve energy efficiency and productivity in manufacturing.
- 42 USC § 13456(a)—The Secretary. shall-(1) pursue a research, development, demonstration and commercial application program intended to improve energy efficiency and productivity in energy-intensive industries and industrial processes; and (2) undertake joint ventures to encourage the commercialization of technologies developed under paragraph (1).

Question 22. Taxes—What rationale is given for the proposal to extend permanently the Renewable Energy Production Tax Credit when many renewable industries have stated their support of a gradual phase-out of this credit?

Answer. The renewable energy investment community requires certainty and predictability if it is to continue to deploy these technologies and once again double generation from wind, solar, and geothermal sources by 2020. Thus, the President has called on Congress to make the renewable energy Production Tax Credit permanent and refundable, providing incentives and certainty for investments in new clean energy.

Question 23. Weatherization Assistance Program—The Weatherization Assistance Program, which is due to be reauthorized at the end of FY 2013, receives $184 million in the President's Budget FY2014 budget request, up from $68 million in FY2012. How did the Administration arrive at the $184 million request? What percentage of that amount is expected to be spent on administrative costs?

Answer. The FY 2013 request of $68 million for the Weatherization Assistance Program (WAP) was artificially low due to funding that was still available through the Recovery Act. The FY 2014 request of $184 million represents the funding that is necessary to support the infrastructure of the Program in the fifty states, the District of Columbia, five U.S. Territories and several Native American tribes.

Of the $184 million requested, $157 million will be provided to the 59 Weatherization grantees using the allocation formula contained in the federal regulations 10 CFR 440.10, and $3 million will be used for DOE Training and Technical Assistance to support the grantee reporting system and to make improvements in the program performance measurements and technology deployment. The remaining $24 million will establish a competitive solicitation to design and develop models to leverage non-federal resources to weatherize multi-family buildings (WAP funds will not be used for loans or other financial instruments).

Approximately $15.7 million will be used to administer the WAP grants, or 10 percent of the $157 million allocated to grantees. The provisions in the federal regulations for administrative cost allowance state that "not more than 10 percent of any grant made to a State may be used by the grantee and subgrantees for administrative purposes in carrying out duties under this part, except that not more than 5 percent may be used by the State for such purposes, and not less than 5 percent must be made available to subgrantees by States." (10 CFR 440.18(e))

Question 24. Building Efficiency—In addition to a 40 percent requested increase in funding for the Building Technologies Program, there is a one-time $200 million request for the Race to the Top Efficiency and Grid Modernization, partly directed

to give grants to applicants who demonstrate best practices in building efficiency. This is in addition to the Better Buildings Initiative (and Better Buildings Challenge) that showcases the best energy saving strategies for buildings. Are you concerned that these programs with similar names create confusion in the marketplace, and could they better be streamlined into a single program? Additionally, is there no better way to allocate $200 million than to give grants? It seems that taxpayer dollars could be better leveraged in this instance.

Answer. The Race to the Top for Energy Efficiency and Grid Modernization is a performance- based challenge designed to motivate states to implement policies that encourage private investment in energy productivity economy-wide. The Better Buildings program focuses on energy efficiency in buildings. Specifically, the Better Buildings program challenges companies and partners in state and local governments to improve building energy performance 20 percent by 2020. The objectives of these two programs are aligned but distinct. States that take advantage of the Better Buildings program may more quickly arrive at best practices for improving energy efficiency in buildings, which could help inform their approach when applying for the Race to the Top for Energy Efficiency and Grid Modernization program. But in order to win, competing states also need to address other aspects of energy productivity.

The Race to the Top for Energy Efficiency and Grid Modernization provides technical assistance to participating states to assist them in improving the market conditions for energy productivity investments. In addition, performance-based awards are designed to motivate the implementation of policies that can draw much larger sums of private-sector investment. Rather than making grants for individual projects, the Race to the Top is designed to address market barriers that persist at the state level across the country. As a result, the Race to the Top for Energy Efficiency and Grid Modernization can deploy federal funds in a way that is very highly leveraged by private sector investment.

Marshall Islands

Question 25. In 2012, Congress enacted the Insular Areas Act of 2011 (Public Law 112-149) that requires the Secretary of Energy, through the DOE's Marshall Islands Program, to monitor Runit Dome on Enewetak Atoll. Recent press reports indicate that DOE intends to begin this mission this summer. What is the timetable for Runit Dome monitoring, how much has been set aside in FY 2013 funds for this summer's activity, how much has been requested from the Department of Interior (DOI) for this summer's activity, and how much is requested in FY 2014 funding?

Answer. Public Law 112-149 was enacted to assist the people of Enewetak Atoll to better understand the long-term environmental and public health consequences of the waste containment structure on Runit Island. The legislation requires that DOE perform the work and that DOI pay for the work related to the radiochemical analysis of the ground- water surrounding and in the Cactus Crater containment structure on Runit Island out of Technical Assistance funds within the Office of Insular Affairs.

In FY 2013, DOE estimated the initial cost for Runit Dome monitoring to be $500,000.

In April 2013, DOI agreed to transfer $215,200 to DOE to begin this work. In FY 2014, DOI is expected to transfer an additional $215,200 to DOE to continue, and DOE will continue to cover any additional costs through the existing DOE Marshall Islands Environmental Monitoring Program. A Memorandum of Understanding between DOE and DOI on Radiochemical Analysis of the Ground-Water Surrounding, and in, the Cactus Crater Containment Structure on Runit Island is under review by both agencies.

DOE developed a plan to provide the scientific and technical basis for the Groundwater Monitoring Program. Runit Dome onsite activities are scheduled to initiate on May 25, 2013. FY 2013 activities include the conduct of an engineering survey of the concrete covering the Dome, assessment of the integrity and load bearing capability of the concrete, and determination of the structural integrity of the Dome to determine if the work can be conducted safely, and to establish the locations for the groundwater sampling wells. Future activities involve drilling bore holes for sampling over an 18 months baseline period and performing radiochemical analyses. Upon completion of the baseline, DOE will issue a final report describing requirements for conducting a long-term Groundwater Monitoring Program at Runit Dome.

Question 26. Unobligated Balances-Please provide a full and detailed list of all unobligated balances for every program and account at the Department of Energy.

Answer. The Department is providing the Committee with detailed unobligated balance report from with this submission.

Question 27. DOE Contracting—At a recent House hearing, Inspector General Gregory Friedman said that contracting is the "weak underbelly" of the Department of Energy. He stated, ".we need to seriously revisit the question of finding the right balance of oversight of the contractors and at the same time encouraging the contractors, incentivizing the contractors to do the right thing . . . "

27(a) Has the Department taken any steps to address the contracting deficiencies identified by its own Inspector General?

Answer. 27(a) The Department has taken a number of steps to address contracting deficiencies including the following:

- Issuing recent Deputy Secretary memorandum directing:

  —Improved up-front planning
  —Greater use of firm-fixed price contracts
  —Maximized use of objective performance measures
  —Use of provisional fee and cost caps
  —Accurately documenting contractor performance;

- Addressing GAO High-Risk List concerns regarding major DOE contracts and projects (over $750M);

  —Instituting Deputy Secretary-led "Deep Dives" on major contracts;

- Expanding contracting officer certification program to strengthen skill sets; and,
- Improving DOE's enterprise-wide procurement system.

Question 27(b). Please list the Department's strategy for reducing its cost of contracting.

Answer. 27(b) The Department is constantly striving to reduce its cost of contracting. It recently completed a study to assess the size of its acquisition workforce. That report revealed that the cost of contracting was not caused by the size of our workforce, but more a function of continuous learning and training of our workforce and our contracting types and procedures. We are working with the Federal Acquisition Institute to ensure our acquisition workforce is provided the best training possible.

As relayed above, we are also making a concerted effort to transition to the use of more fixed price contracting and, when cost reimbursable contracting is required, base incentives on objective, rather than subjective, factors. We are also focused on leveraging strategic sourcing processes and procedures and greater use of Government Wide Acquisition Contracts (GWAC's) and GSA Schedules.

Question 28. Stimulus Funding—According to the Department's website, it has yet to award or obligate roughly $872 from the 2009 stimulus bill, even though more than four years have passed since it was signed into law.

a. Please summarize all funding that has not been awarded or obligated as of the date of this hearing.

Answer. 28 In the table below, expired funds are no longer available and will be or have been returned to Treasury in accordance with the Dodd Frank Act. As part of the Dodd Frank Act, DOE requested and received a Presidential waiver for $96M. These funds have no expiration date, and are only available to cover modification costs on existing Loan Program Section 1705 ARRA loans.

Prior Year Deobligations (PYDs) are considered expired and will be cancelled on September 30, 2015. Cancelled PYDs will be returned to Treasury. As reflected in the change from February to March, the PYD total will continue to increase as work is finished under cost and closed out, awards are terminated for failure to meet project milestones, etc.

As of FEB-13	Expired	$ 456,020,916
	Waived	$ 96,000,000
	PYDs	$ 319,672,511
	Total	$ 871,693,426

As of MAR-13	Expired	$ 456,020,916
	Waived	$ 96,000,000
	PYDs	$ 347,920,843
	Total	$ 899,941,759

b. Please explain what the Department plans to do with the funding that has not been awarded or obligated.

Answer. With the exception of the $96M of presidentially-waived credit subsidy balances the other funds will be or have been returned to Treasury.

c. Is the Department considering returning some or all of that funding to the Treasury? If no, please explain why not.

Answer. With the exception of the $96M of presidentially-waived credit subsidy balances the other funds will be or have been returned to Treasury.

Question 29. Full time Employees—Please list the Department's total number of full time employees in 2008, as compared to today. Please include a breakdown of FTEs by office, showing any changes between 2008 and today.

Answer. The Department is providing information on the number of full time employees as requested to the Committee with this submission.

Question 30. To what extent, if any, is the Department of Energy involved with the President's/National Export Initiative and the Trade Promotion Coordinating Committee? Are high-level department officials ever asked to attend meetings of these organizations or otherwise offer their expertise and input?

Answer. The Department of Energy is a member of the Trade Promotion Coordinating Committee (TPCC), which includes multiple subcommittees focused on specific sectors. DOE participates in semi-annual meetings among TPCC agency principals. At these meetings, DOE is typically represented by the Assistant Secretary for Policy and International Affairs. The DOE Assistant Secretary for Nuclear Energy co-chairs the Subcommittee on Civil Nuclear Energy, and the DOE Assistant Secretary for Energy Efficiency and Renewable Energy co-chairs the Subcommittee on Renewable Energy and Energy Efficiency. DOE also participates at the staff level in the TPCC Environmental Technology Working Group as well as the Infrastructure Working Group.

In the Executive Order that launched the National Export Initiative, the President established an Export Promotion Cabinet (EPC), and the Secretary of Energy is a member of the EPC. Because the EPC and TPCC have substantial overlap in membership, meetings at the principals level tend to be held jointly. At these meetings, DOE is typically represented by the Assistant Secretary for Policy and International Affairs.

DOE participates in trade promotion activities through the TPCC and the National Export Initiative implemented under the EPC, and DOE often provides energy-related technical expertise to support cross-agency activities, including commercial advocacy and review of export promotion strategies for specific countries or specific industries. Export credit agencies such as OPIC and the Export Import Bank are also active in the TPCC, and DOE provides these agencies with direct technical assistance through its energy programs and national labs.

Question 31. Does the Department of Energy collaborate with the State Department's Bureau of Energy Resources? If so, to what extent and in what specific ways?

Answer. The Department of Energy collaborates with the State Department's Bureau of Energy Resources (ENR) on a number of shared initiatives, including the International Energy Agency, International Renewable Energy Agency, Energy and Climate Partnership of the Americas and the U.S.-Iraq Joint Coordinating Committee on Energy. DOE has responsibility for providing expertise on energy policies, technologies, and markets, and analyzing energy security implications, whereas ENR provides leadership on the nexus of energy and foreign policy matters and the energy implications of U.S. diplomatic objectives. DOE leads a number of direct interactions with energy ministry counterparts with key energy producing and consuming countries, and ENR provides leadership on foreign policy and geostrategic implications. DOE supports overall ENR-led economic and foreign policy dialogues, and offers expert energy policy and technical input to ENR-led foreign policy initiatives.

Question 32. Does the Department provide any expertise, funding or other support to oil and gas projects in other countries— through the Office of Policy and International Affairs or any other office? If so, which projects in which countries?

Answer. The Department of Energy does not provide funding for the development of oil and gas projects in other countries, as that is the private sector's role. DOE does provide technical expertise and shares best practices with foreign countries. DOE also engages in R&D cooperation in those instances where doing so can advance DOE programmatic objectives.

DOE's Office of Policy and International Affairs (DOE/PI), often in conjunction with DOE/Office of Fossil Energy (DOE/FE), holds workshops and roundtables on investment climate issues relating to oil and gas, but not on specific oil exploration and drilling projects. DOE/PI also has helped facilitate studies, and sponsor or provide support for conferences/workshops on such issues as unconventional resource exploration and development, shale gas cooperation, and safe operation and maintenance of natural gas systems. DOE/PI also holds regular bilateral meetings with key energy producers and consumers, facilitating sharing of market trends, technology trends and best practices to promote safe, responsible development of oil and gas, among other energy resources, with the goal of strengthening all nations' contribution to world supplies and enhancing U.S. energy security.

DOE/FE provides technical expertise and support to countries that wish to develop their resources through the following:

- Engages in bilateral meetings, sharing technology, experience, and best practices to promote safe, responsible development of oil and gas resources in other countries and regions, which contributes to world supplies and enhances U.S. energy security;
- Holds regular bilateral meetings with the participation of the private sector to share expertise and help U.S. companies to do business in other countries;
- Conducts methane hydrates research collaboration under international agreements with Japan, India, and South Korea; and
- Supports, through the International Energy Agency, a high-level forum on best practices for unconventional gas development.

DOE/OE provides technical expertise and support to strategic countries that wish to enhance/protect their critical energy (oil/gas) infrastructure through the following:

- Engages in bilateral meetings, sharing technology, experience, and best practices to improve the reliability, survivability, security, and resiliency of strategic countries' energy sectors, which enhances U.S. energy security and contributes to global oil/gas supplies; and
- Provides, through its headquarters personnel and the National Laboratories, technical expertise and assistance such as: training, system effectiveness assessments, modeling and simulation, and technical exchanges.

Question 33a. Administration Policy—In the second paragraph of your written statement, you note that "the President's approach is working."

You claim that oil and natural gas production have gone up every year during this Administration. Has that been the case for the last two years, 2011 and 2012, on the federal lands and waters under the President's control?

Question 33b. Administration Policy—In the second paragraph of your written statement, you note that "the President's approach is working."

Next you claim that generation from wind, solar, and geothermal have doubled. Can you give us the percentages, to show "doubling" really means for each of those resources, as a percentage of total electricity generation?

Answer 33a. While the U.S. Energy Information Administration (EIA) estimates that the overall production of crude oil (including lease condensate), natural gas, and natural gas plant liquids on federal and Indian lands and waters each de-

creased in fiscal year (FY) 2011 and FY 2012, there are different trends in offshore versus onshore federal production.

Production of crude oil on federal onshore lands has increased for both FY 2011 and FY 2012. Crude oil production on Indian lands, administered by the federal government, also increased in FY 2011 and FY 2012. Production of crude oil from offshore federal waters decreased in both FY 2011 and FY 2012. Production of natural gas on federal lands decreased in FY2011 and remained virtually unchanged in FY 2012. Production of natural gas from federal waters decreased in both FY 2011 and FY 2012. Production of natural gas plant liquids on federal onshore lands increased in both FY 2011 and FY2012 and decreased in both years from federal offshore waters. EIA's estimates are based on sales data processed by the Department of the Interior's, Office of Natural Resources Revenue as of March 15, 2013. Data are available for fiscal years only.

Answer 33b. In the beginning of his administration, President Obama set out to double renewable generation from wind, solar, and geothermal resources. This goal was to double the collective electricity generation of all three resources, not the generation of each nor the percentage of total generation of each. In January 2009 when the President took office, the United States produced 71,843 gigawatt-hours (GWh) of electricity from wind, solar, and geothermal technologies. In January 2012, U.S. renewable generation reached and surpassed the doubling target; wind, solar, and geothermal technologies produced 145,302 GWh of electricity. Recently, the President has established a new goal of doubling electricity production from wind, solar and geothermal by 2020.

Question 33c. You state that "carbon emissions" are at their "lowest level.in nearly two decades." What percentage of that decrease would you attribute to the economic downturn, the very slow recovery, and/or the shale gas revolution?

Answer 33c. In the latest annual report by the Council of Economic Advisors, the emissions reduction from 2005 to 2012 were broken into three broad areas and given the following weights: slower economic growth than trend growth (52 percent), cleaner energy from switching to both natural gas and renewables (40 percent), and accelerated energy efficiency (8 percent) relative to trend. These are based on the 2005 values of the carbon content of energy, energy efficiency, and GDP. The business-as-usual projections are based on published forecasts or historical trends.

Question 34. ATVM/Fisker—On the evening of April 18, Bloomberg posted an article with the headline, "Fisker Spent $660,000 on Each $103,000 Plug-In Car." The article states that, "Fisker was allowed to keep using money from its Energy Department loan after violating its terms multiple times, according to a report released April 17 by PrivCo, a New York-based researcher specializing in closely held companies."

Question 34a. Is the PrivCo report accurate, in that "Fisker was allowed to keep using money from its Energy Department loan after violating its terms multiple times."?

Answer 34a. The referenced article is based on an inaccurate April 17, 2013 PrivCo report.

Specifically, in the report's timeline of alleged events of default, every date listed comes after the Department had already stopped disbursements to Fisker in June 2011.

Question 34b. The Department's Loan Programs Office website claims that its Fisker loan resulted in 2,000 jobs "created/saved." Is that figure accurate? How many employees does Fisker currently have?

Answer 34b. The ATVM statute does not require applicants to submit estimated jobs figures during the application process. However, the Loan Programs Office requests this information from applicants. Such estimates are not verified and do not include indirect jobs or the economic activity created throughout the supply chain. LPO represents these figures supplied by the borrower.

RESPONSES OF DANIEL B. PONEMAN TO QUESTIONS FROM SENATOR LANDRIEU

Plutonium Disposition

Question 1. Former Senator Slade Gorton, who was a member of the 9/11 Commission, wrote in an op-ed last month that every dollar diverted away from plutonium disposition delays the effort to get rid of plutonium and every delay is potentially more time for the material to be stolen. He also wrote that eliminating the plutonium and other fissile material ensures the highest nuclear security, because the material can never be stolen and used by terrorists. As an added benefit, the tens of millions of dollars a year it takes to guard this dangerous material will be saved. Would you agree with Sen. Gorton and why?

Answer. The United States recognizes the importance of eliminating surplus fissile materials and is firmly committed to disposing of surplus weapons-usable plutonium.

Question 2. In June 2010, President Obama at a joint press conference with Russian President Medvedev stated, "And to prevent terrorists from acquiring nuclear weapons, we came together at our Nuclear Security Summit, where our two nations made numerous commitments, including agreeing to eliminate enough plutonium for about 17,000 nuclear weapons." How are you going to honor the commitment President Obama made to Russian President Medvedev and fully fund NNSA's Office of Fissile Materials Disposition and the MOX Project?

Answer. The United States remains committed to achieving the important nonproliferation mission associated with the disposition of excess weapon-grade plutonium and to our agreement with Russia. However, considering the unanticipated cost increases associated with the MOX fuel approach and the current budget environment, the Administration is conducting an analysis to determine whether there are options to complete the mission more efficiently.

Question 3. The plutonium agreement with Russia is one of the few agreements that seems to be working with the Russians, without the complaints and bluster that we've seen with other agreements, and the acrimony we've seen in U.S.-Russia relations over the past 2 years. Why pause the MOX program, which underpins this very successful agreement, the Plutonium Management and Disposition Agreement?

Answer. As mentioned in response to your previous question, the United States remains committed to achieving the important nonproliferation mission associated with the disposition of excess weapon-grade plutonium and to our agreement with Russia. However, considering the unanticipated cost increases associated with the MOX fuel approach and the current budget environment, the Administration is conducting an analysis to determine whether there are options to complete the mission more efficiently.

Question 4. Could you explain the decision to move the Next Generation Nuclear Plant (NGNP) program under the umbrella of Reactor Concepts Research Development and demonstration? Could you also explain the shift laid out to move funding away from NGNP within the larger RCRD&D budget? In addition, could you give a more precise accounting of what funds under RCRD&D will be dedicated to the NGNP project?

Answer. In FY 2014, the Next Generation Nuclear Plant (NGNP) Demonstration Project activities are being refocused from development and deployment towards longer term research. Consistent with these actions NGNP is eliminated as a separate subprogram and the ongoing research activities will be funded alongside other Advanced Reactor Concepts research. The Department will continue materials and fuels research and development to address technical uncertainties with high temperature reactor technology. This consolidation with RCRD&D and continued research reflects the synergy with the areas of uncertainty that crosscut other advanced reactor concepts. The plans for FY 2014 call for $20,000,000 of the requested $31,000,000 to be devoted to continuing fuels and graphite research for high temperature gas-cooled reactors broadly.

Management of the research efforts under the Advanced Reactor Concepts and the research performed under the Advanced Small Modular Reactors R&D has been consolidated into the Office of Advanced Reactor Technologies and is expected to gain efficiencies and improve prioritization in addressing those issues facing advanced non- light water reactor concepts, including high temperature metals, instrumentation and controls, and supporting reactor and energy conversion technology.

Responses of Daniel B. Poneman to Questions From Senator Barrasso

Question 1. The Consolidated Appropriations Act for FY2012 specifies that "No later than June 30, 2012, the Secretary [of Energy] shall submit to [Congress] a revised excess uranium inventory management plan for fiscal year 2013 through 2018." Over nine and a half months after this deadline and over six and a half months into FY 2013 DOE has still not submitted a revised excess uranium management plan. A. When will DOE submit to Congress the revised plan? Will DOE submit to Congress the revised plan before June 30, 2013? B. What is the reason for the delay?

Answer. Upon completion of appropriate reviews the report will be submitted to Congress.

Question 2. On April 18, 2013, Fuel Cycle Week reported that "DOE may barter uranium inventories in order to supplement the funding from Congressional appropriations" for cleanup in Paducah. Is DOE considering transferring, bartering, or

selling any additional uranium that DOE has not already disclosed to the public? If so, please explain in detail:

a. the quantities of uranium DOE will dispose of;
b. in what manner DOE will dispose of this uranium;
c. at what time DOE will dispose of this uranium;
d. to whom DOE will transfer, barter, or sell this uranium; and
e. the steps DOE will take to ensure that all DOE uranium disposition (including dispositions already known to the public) will not have an adverse material impact on the domestic uranium mining and conversion industries taking into account the sale of uranium under the Russian HEU Agreement and the Suspension Agreement.

Answer. The Department has not made any decision to transfer uranium in exchange for cleanup services at its Portsmouth or Paducah sites in excess of those amounts contemplated in the May 15, 2012 Secretarial Determination (May 2012 Determination), which specifically considered the following transfers for cleanup services:

> Up to 2,400 metric tons of uranium (MTU) per year of natural uranium to DOE contractors as compensation for cleanup services at the Gaseous Diffusion Plant sites at Paducah, Kentucky, or Portsmouth, Ohio, in quarterly transfers of up to 600 MTU for the period 2012 through 2021.

The May 2012 Determination found that these transfers will not have an adverse impact on the domestic mining, conversion or enrichment industries. The Department's uranium transfers in 2013 are proceeding consistent with the May 2012 Determination. DOE will comply with all laws and regulations, including section 3112(d) of the USEC Privatization Act, if applicable. As required by section 312 of the Consolidated Appropriations Act, 2012, DOE will provide notice to Congress of uranium transfers in exchange for accelerated cleanup services at a Federal site and such notice will include all information required by that section.

Question 3. You testified that DOE has received about 200,000 public comments related to the DOE commissioned study on LNG exports. Roughly what percentage of all the public comments duplicate, in whole or in part, other public comments on the study?

Answer. DOE received over 188,000 initial comments and approximately 2,700 reply comments. DOE reviewed each comment and placed every comment received in the LNG Study docket which is posted on DOE's website. The initial comment table consists of 399 rows, with each row consisting of comments DOE assessed to be unique. The reply comment table consists of 375 rows, which DOE assessed to be unique. In total, DOE assessed there to be 774 unique comments, which totals to less than 1 percent of all comments received.

Question 4a. About two weeks ago, it was reported that Fisker Automotive laid off about 160 employees or 80 percent of its staff. In 2010, DOE awarded a $529 million loan to Fisker Automotive. I understand that DOE cut off the loan to Fisker at about $193 million and that Fisker is now on the verge of bankruptcy. There is approximately $4 billion of unobligated appropriations for the ATVM loan program. I understand that DOE hasn't awarded any new ATVM loans over the last two years. As of January 29, 2013, there weren't any active ATVM loan applications.

Given the unprecedented cuts to the Federal budget, isn't it time congress rescind the $4 billion in ATVM loan money?

Answer 4a. DOE has supported a broad range of companies, including large mature companies and start up ventures, and a broad set of projects, including advanced technology vehicle manufacturers and suppliers. DOE is committed to administering the program as effectively and efficiently as possible. As the Loan Programs Office is not a policy making program, it has not formed a view on this topic.

Question 4b. Wouldn't you agree that our country has much higher priorities than the ATVM loan program—such as reducing the Federal deficit and debt?

Answer 4b. As the Loan Programs Office is not a policy making program, it has not formed a view on this topic.

Question 5. The Office of Legacy Management is responsible for monitoring and cleaning up contaminated sites throughout the country. Many of these sites are in the West and a number of sites are on Indian reservations, including the Wind River in Wyoming. The President's Budget for FY 2014 requests a $7.38 million or 4.4 percent increase for the Office of Legacy Management. Meanwhile, the President has requested hundreds of millions of dollars in new spending on so-called clean energy programs. Is the Office of Legacy Management still a priority for the Administration? If so, why isn't that reflected in the President's Budget for FY 2014?

Answer. The President's Budget for FY 2014 for DOE provides for the Office of Legacy Management (LM) to continue monitoring closed former inactive uranium

milling sites and other sites for which LM is currently responsible. This would include groundwater monitoring and data analysis at the former Riverton uranium milling site on the Wind River Reservation in Wyoming. In addition, the Administration's budget request includes funding for a cooperative agreement with the Northern Arapaho Tribe to continue to provide drinking water to residents in the vicinity of the Riverton site, as well as a recently established agreement with the Wind River Tribes to support independent data collection and community outreach.

Question 6. On February 19, 2013, DOE announced the availability of the Data Summary Report conducted in August of 2012 at the Uranium Mill Tailings Radiation Control Act site in Riverton, Wyoming. I understand that the Report shows that groundwater contamination at this site increased after the 2010 historic flood event of the Little Wind River. DOE has said it will provide an analysis of this data in the annual Verification Monitoring Report which will be available later this year. A. When specifically does DOE plan to release the Monitoring Report? B. What steps will DOE take to ensure that the Monitoring Report is distributed widely throughout the Riverton community?

Answer. DOE anticipates completing the Monitoring Report by the end of FY 2013 that analyzes and interprets the data from the additional studies that were conducted after the 2010 historic flood on the Little Wind River in Riverton. Preliminary results indicate groundwater contaminant levels are returning to pre-flood concentrations. In addition, DOE increased its technical staff to manage the work at the former Riverton uranium milling site by hiring a hydrologist familiar with the area's groundwater who is a graduate of the University of Wyoming.

DOE will ensure that the report is widely distributed including making it available on its website, providing copies in a reading room at the Riverton Public Library, and sending copies to at least 10 organizations including the Northern Arapaho and Eastern Shoshone Tribes, the Wyoming Department of Environmental Quality, and the U.S. Nuclear Regulatory Commission. In addition, press releases may be prepared, and interviews provided to the press, television news, and radio reporters.

Question 7. The President's Budget for FY 2014 states that: "Environmental remediation of NPR-3 facilities will continue to facilitate the sale/disposition of the property in a manner consistent with an approved property sale/disposition plan. Final disposition of the property is estimated to occur in FY 2015." A. Has DOE completed a sale/disposition plan for the property? If not, when will DOE complete the sale/disposition plan? B. Will DOE make the sale/disposition plan available to the public?

Answer. The Department has completed the draft Naval Petroleum Reserve No. 3 Disposition Decision Analysis and Timeline. The draft is currently undergoing Departmental and Office of Management and Budget review. As soon as all required concurrences are received, the Decision Analysis will be transmitted to Congress. At that time the Decision Analysis will also be available to the public.

Question 8. DOE has a very small program called the Experimental Program to Stimulate Competitive Research (EPSCoR). I understand that nine of the ten largest energy producing states, including Wyoming, are EPSCoR states. Would you provide a state-by state listing of the amount of R& D funding made available to each state from DOE during the most recent three years for which such information is available?

Answer. A table showing DOE's EPSCoR funding for those states and territories that received EPSCoR funding in FY 2011, FY 2012, and current FY 2014 planned funding is as follows:

DOE EPSCoR Funding by State

(dollars in thousands)

	FY 2011 Approp.	FY 2012 Approp.	FY 2014 Request
Alabama	585		1
Alaska		—	446
Delaware	780	979	330
Idaho	130	—	—
Illinois	125		—
Kansas	—	150	150
Kentucky	590	590	590
Louisiana		—	
Maine	600	600	600
Montana	505	125	140
New Hampshire	700	700	—
New Mexico	480	150	150
North Dakota	600	150	150
Oklahoma	—	—	429
Puerto Rico	770	1,511	29
Rhode Island	2,355	1,932	2,137
South Dakota		—	497
Tennessee	—	1,333	150
West Virginia	300	300	300
Wyoming		—	408
Unallocated	—	—	2,139
Total, EPSCoR	8,520	8,520	8,520

The FY 2014 Request column represents current estimates, reflecting multi-year grants that will be incrementally funded. In addition to the states and territory listed above, the following other states and territories were also eligible for EPSCoR funding: Arkansas, Guam, Hawaii, Iowa, Mississippi, Missouri, Nebraska, Nevada, South Carolina, U.S. Virgin Islands, Utah, and Vermont. Also, Iowa, Tennessee, and Utah will lose their eligibility in FY 2013, but any current awards will continue through completion. FY 2011 funding in Illinois supported a detailee providing technical assistance to the EPSCoR program. Illinois is not eligible for EPSCoR awards.

Each of these states is also eligible for funding through other mechanisms, including funding opportunity announcements for research across the Office of Science and other DOE programs, and in many cases, these states receive significantly more non-EPSCoR funding from DOE than the EPSCoR amounts shown in the above table.

RESPONSES OF DANIEL B. PONEMAN TO QUESTIONS FROM SENATOR CANTWELL

Question 1. While the FY 2014 budget request for the Department of Energy is generally strong, I do have a significant concern about the proposed Electricity Systems Hub.

While I know Dr. Moniz has yet to be confirmed, I was encouraged by his testimony last week, when he voiced his explicit support for investment in DOE's smart grid program, given the centrality of grid modernization to a host of DOE missions and national energy policy goals.

Dr. Moniz also recognized the vital, direct role that DOE has played in accelerating energy storage R&D, as well as the Department's efforts to demonstrate and validate the performance of new storage technologies-key to encouraging utility and financiers' investment in the sector.

I am disappointed that this proposed budget follows the same path as last year's budget request: funding for smart grid R&D as well as energy storage in DOE's Office of Electricity (OE) seems to fall far short of the national need.

While a number of Senators and I have also supported the concept of an Electricity Systems Hub, we have cautioned the Department against doing so at the expense of these underlying programmatic activities.

Please explain the Department's plan for ensuring sufficient funding for these underlying smart grid and energy storage R&D program activities, and expand on DOE's vision for an Electricity Systems Hub. How does establishing the Hub at the expense of other grid programs help advance a 21st century grid?

Answer. The FY 2014 request of $169 million for DOE's Office of Electricity Delivery and Energy Reliability includes critical investments that will continue progress towards enhancing the capabilities of a modern power grid. Strategic decisions were made to prioritize the request to provide a balanced portfolio of programs and projects, including investments in enhanced capabilities to better respond to energy disruptions, cybersecurity technologies and capabilities for the energy sector, and modeling and analysis to enhance reliability and resiliency. The FY 2014 request also reflects ongoing efforts to leverage grid-related investments across the Department, other Federal agencies, and the industry to maximize cost effectiveness and results.

Investing in the Electricity Systems Hub will focus on the seam between transmission and distribution—a pinch point of grid modernization where power flows, information flows, policies, and markets intersect—tackling the critical issues and barriers associated with achieving a seamless grid and facilitating the numerous changes that are happening system-wide. The Hub activities will accelerate adoption of new technologies within a policy and regulatory framework that allows efficient utilization of assets and capital investment, including minimizing consumer costs for grid modernization. Regional diversity in resources, markets, and policies also presents unique challenges that are best addressed through an integrated systems approach. A concerted effort at the Hub will enable many grid activities at the Department to come to a focal point and provide a platform for demonstrating and testing new technologies and concepts, including those in energy storage and smart grid.

Question 2. DOE's FY 2014 Budget Request includes funding for U.S. participation in BELLE II, an international high energy physics project located in Japan. The United States has been one of the key partners in this project for several years, with support from the Office of Science's High Energy Physics Program. This is an important year for the project and the U.S. role in it, since it marks the transition from prototyping to actual constructing of the upgraded BELLE II detector. This transition is noteworthy from a budgetary standpoint; with the commencement of the construction phase, BELLE II is now classified as a new project start and, as such, U.S. participation would be suspended under another Continuing Resolution. I am concerned that this interruption could cause further harm to the reputation of the United States as a reliable partner in the international science community, in the same way that past interruptions to our funding for other "big science" projects have. What could be done from the DOE side to ensure that the United States would be able to honor its commitments to BELLE II and other international projects in the event of another Continuing Resolution?

Answer. The Office of Science is working with the Pacific Northwest National Laboratory (PNNL), the DOE project lead, to develop a mitigation plan that is consistent with the relevant laws and appropriations committee guidance, and will closely coordinate our plans with Japan's KEK laboratory that is hosting BELLE-II.

The mitigation actions could include the development of advanced prototypes, preparing acquisition plans, and conducting project reviews in advance of the approval of a new start. We will not allow the expenditure of capital equipment funds without the approval of a new start from Congress and the appropriations authority to obligate funds for that purpose.

Question 3. Last week, Energy Secretary Ernest Moniz provided a response to my question about technology transfer and giving the labs greater flexibility in this im-

portant area. I understand there is a need to investigate this issue more fully, but I am concerned that historically these issues have lingered without resolution. I would like your assurance that progress will continue. To ensure resolution, will you commit to working with the National Lab Director's Council (NLDC) to develop an approach that is supported by the NLDC to resolve outstanding issues, especially enhancement to ACT and enablement of technology maturation?

Answer. The Department will continue to look for ways to improve the laboratories' ability to conduct the technology transfer mission. DOE has recently modified its requirements for advanced payments from non-Federal sponsors. The Department has also created a Licensing Guide in order to provide prospective licensees with an understanding of the terms and conditions found in most DOE laboratory intellectual property license agreements.

The Department initiated a pilot program, Agreements for Commercializing Technology (ACT) that allows for greater flexibility when negotiating a contract with a non-Federal customer wanting to fund work at a DOE laboratory. DOE is currently monitoring the progress and results of this pilot. Currently six national laboratories-Brookhaven, Oak Ridge, Pacific Northwest, Idaho, Lawrence Livermore, and the National Renewable Energy Laboratory-have been participating in the ACT pilot.

The ACT pilot is in a very early stage. Several pilot sites are working on ACT agreements, but so far, only the Pacific Northwest National Laboratory has completed an ACT agreement. It is not yet evident whether ACT will be successful and become a preferred approach when working with a DOE laboratory. We will continue to collect feedback from representatives from each of the ACT pilot sites and the NLDC. ACT enhancements will be considered in greater detail after the results of the pilot have been analyzed and in the context of applicable Federal laws and regulations.

Regarding enabling technology maturation, Cooperative Research and Development Agreements (CRADA) allow laboratories to partner with industry, universities, and state and local government organizations to increase the Technology Readiness Level (TRL) of selected technologies. The laboratories are also able to use royalties from licensing their technologies to fund technology maturation activities. The Department is also exploring other ways to support technology maturation at the laboratories.

Question 4. Within a few years, 90 percent of Hanford site will be cleaned up. As cleanup finishes, the Tri-Cities community is looking to diversify its economy. To that end, Congress provided the Energy Department with the authority to transfer nuclear defense properties over to economic development. DOE completed a Comprehensive Land Use Plan in 1999 and a 2008 update identified nearly 10 percent of the Hanford Site that could be used for industrial development in the future.

(a) Does the Department view this Comprehensive Plan, which Congress required as part of the National Defense Authorization Act of fiscal year 1997, as the blueprint for its decisions on future land uses at Hanford?

Answer. Yes.

(b) President Obama issued a "Memorandum on Disposing of Unneeded Federal Real Estate" on June 10, 2010 that may have clouded important authority that Congress provided the Department of Energy in Sections 3154-3155 of the National Defense Authorization Act of fiscal year 1994. Does the Department believe that it currently still has all of these authorities that Congress granted and the ability to use them, particularly those in Section 3155(a)?

Answer. Yes. The Department has the ability to use the discretionary authorities provided under sections 3154 and 3155. Under Section 3154 the Secretary may lease real and related property at a facility to be closed or reconfigured, and under 3155(a), the Secretary may transfer unneeded personal property at DOE facilities to be closed or reconfigured.

RESPONSES OF DANIEL B. PONEMAN TO QUESTIONS FROM SENATOR FLAKE

Question 1. Administrator Jackson, signed a "joint Federal Agency Statement Regarding Navajo Generating Station." Among other things, the Secretaries and the Administrator committed to forming an NGS Working Group. Has that Group been formed? If so, what is the status of the working group discussions? If not, why have the Agencies delayed in forming the group?

Answer. In January 2013 the Joint Federal Agency Working Group was formed and began meeting on the items delineated in the Joint Federal Agency Statement. These meetings have been held on numerous occasions via electronic audio and visual links. The working group has shared the knowledge and background of the individual agencies and begun developing joint efforts.

Question 2. In the joint agency statement, the Department of Energy (DOE) committed to "reviewing current and expected future agency resources (grants, loans, and other applicable resources) for potential use towards pollution control, renewable energy development water delivery, or other regional needs, and seeking funding to cover expenses for plant pollution control or other necessary upgrades for the Federal portion of NGS." Does DOE's budget include any funding or other resources for the implementation of EPA's BART proposal? If so, please describe the nature of those commitments.

Answer. In Goal 4 of the Joint Federal Agency Statement, DOE did agree to explore resources available to support plans developed for the Navajo Generating Station (NGS). The Agencies and the owners of the NGS are still in the stage of defining the scope of potential actions. Comments are due in August 2013 on the EPA BART proposal. Following those comments EPA will finalize the scope and timeline for action. Without those significant clarifications on the scope, specific actions are not clear enough to justify budget requests from any of the Federal partners. Future plans and actions by the NGS owners and further engagement with the Federal Agencies will allow DOE to determine its appropriate role in supporting the joint agency efforts.

Question 3. In the joint agency statement, DOE committed to "support, through funding or other means," Phase 2 of the National Renewable Energy Laboratory's analysis of Navajo Generating Station. Please describe how DOE's budget proposal reflects that commitment.

Answer. The Joint Agency Working Group has begun planning of the Phase 2 analysis. One section of the scope has been sponsored by the Bureau of Reclamation. This has helped to inform the deliberation now underway among the NGS owners. The remaining scope will be developed after the EPA has made a final determination on the BART ruling. Since the scale and timing of the Phase 2 analysis is not possible to define at this time, no funding request has been generated.

Question 4. What is the status of NREL's Phase 2 analysis of NGS?

Answer. The Joint Agency Working Group has been developing a draft scope of work for inclusion in a possible Phase 2 analysis. At the current time the first actions in this scope have been sponsored by the Bureau of Reclamation to look at options for the owners of the Navajo Generating Station. As the requirements of the EPA are finalized, the scope of future efforts will be defined and planned for scope, schedule and costs.

Question 5. Since January 4, 2013, has DOE met with any of the NGS stakeholders including CAP water deliver customers to discuss alternatives to NGS? If so, what was the nature of those conversations?

Answer. Since the scope of the specific requirements which will be implemented at Navajo Generating Station have not been finalized through the EPA regulatory process, DOE has not made any efforts for our staff to describe the Joint Federal Agency Working Group or asked for comments from any members of the public. We did host a meeting with CAP board members and management in our offices. Our general plan is to hold meetings with public audiences as a Joint Work Group. Early plans have been developed for hosting such meetings in Arizona later in 2013.

Question 6. In the Energy Efficiency and Renewable Energy (EERE) budget justification, DOE explains that its proposal seeks to make "clean energy technologies directly cost competitive, without subsidies, with the energy technologies we use today." DOE further states, "We are now in the unique position where a wide array of technologies—from solar power, wind power, and plug-in electric vehicles, to solid-state lighting and cellulosic biofuels—are within 5-10 years of being directly price-competitive without subsidies." Consistent with that analysis, does DOE's budget proposal provide for rescinding those subsidies in 5 or 10 years? If so, how has OMB scored those rescissions?

Answer. DOE's budget request does not include any policy proposals concerning subsidies for clean energy technologies. DOE will continue to share the results of its technology development and demonstration programs to inform future Administration policies.

Responses of Daniel B. Poneman to Questions From Senator Manchin

Question 1. In your comments in front of the committee, you stated that the administration has a "$6 billion investment on CCPI and carbon sequestration projects." However, that's a little disingenuous, as we haven't actually spent that much money. A lot of those projects have either not gone forward yet—like FutureGen—or have been withdrawn.

While I'm happy that we're not spending money on projects that we've decided aren't going to work, such as in the case of the projects that are being withdrawn, but it's a little disingenuous to say that we've spent that money no Clean Coal.

So my question is this: how much money has this administration actually spent—not "authorized to spend" but actually spent—on Clean Coal research?

Answer. Clean coal technologies encompass a number of programs within the Department of Energy, including deployment of current generation technologies; development of next generation technologies; and investments in basic research through our Office of Science, and ARPA- E.

- The CCPI program is a multi-billion dollar, competitive demonstration program that has been implemented in three rounds. The program provides government funding to advanced, clean coal projects that represent technological advances over current commercial technology. The CCPI program financially supports projects selected with appropriated dollars, which also leverage investments from industry. The CCPI program has spent ~$568 million on 12 projects, leveraging an investment from industry of ~$9.767 billion. In addition, ~$826 million have been obligated and committed to our industrial partners over the next few years to complete the four active CCPI projects, for a total investment of $1.4 billion.
- The FutureGen program has outlayed $92 million of the total obligation of $1.048 billion obligated to the project, leveraging an industry investment of $717 million.
- The Industrial Carbon Capture & Sequestration (ICCS) program has obligated and outlyed $677 million on 51 projects, leveraging an industry investment of $560 million. Approximately $810 million that has been obligated and committed to our industrial partners remains to complete the 39 currently active projects, for a total investment of $1.5 billion.
- In addition to the above three programs, this Administration has obligated roughly $1.8 billion in clean coal research through the Office of Fossil Energy, and an additional $100 million through our Office of Science, and ARPA-E.

Budget authority is "spent" in two steps: obligations and outlays. The Department has obligated roughly $5.85 billion, which supports the statement made in my testimony. However, as is standard project management practice, the Department outlays funding only after projects meet specified milestones.

Question 2. In your comments, you state that research into geologic carbon sequestration is very important. Yet we've cut the budget for this research by $54 million dollars at a critical point in the development of these technologies. Specifically: these projects, which have been in moving steadily forward for ten years, are critical to the safe injection and storage ofCO_2, and are just entering the injection and environmental monitoring stage. If we stop now, all of that research will have been for naught.

My question is this: I understand we have a limited amount of funds, but if these projects are so critical, why are we cutting funding to projects like CO2 storage at a time when they are just getting started? Especially when we're doubling down on Energy Efficiency and Renewable Energy (EERE), with a $2.7 billion budget request there? Are you saying that we can afford to increase funding for EERE by almost one billion dollars, but we can't afford to spend five percent of that increase on geologic sequestration?

Answer. The FY 2014 budget request prioritizes research and development (R&D) activities on carbon capture technologies which have greater potential to reduce the cost and energy penalty of carbon capture and storage. The FY 2014 request for carbon storage continues to support the Program's existing field projects, which are focused on large volume development tests of storage technologies, injection techniques, and monitoring at selected geologic site locations, as well as its existing R&D activities.

Question 3. The Pay-TV industry—cable tv, satellite TV, etc.—has been working to address their energy impact. For example, they're working to reduce the energy usage of the cable boxes that people have in their houses, the so called "set-top boxes".

I want to voice support for what this industry has done to address this issue: set-top box energy efficiency. The industry proactively developed a consensus agreement that will save their customers money, deliver immediate energy savings, and still encourage innovation and competition.

However, there has been some pushback from the DOE that—despite the industry efforts to be figure out a commonsense solution—they're going to regulate them anyway.

I fear that any DOE regulation would harm the Agreement's progress, increase consumer costs, and slow innovative applications that benefit consumers. Voluntary Agreements have become and internationally approved approach, with counterpart agreements in Europe and Australia. What is the Department doing to support, and not undermine, this industry initiative?

Answer. The Department encourages the development of market-based solutions that are a result of a consensus from all relevant parties, and has recently finalized several rules through consensus agreements. In the case of set-top boxes, DOE had a rulemaking in process, which it suspended for a six-month period in 2012 following a request from Pay-TV, consumer electronics industries, and energy efficiency advocates to provide these stakeholders time to negotiate a voluntary agreement. The Department is now proceeding with the rulemaking, with DOE issuing an initial Notice of data availability (NODA) analysis on February 28, 2013, that presents DOE's initial analysis estimating the potential economic impacts and energy savings that could result from promulgating a regulatory energy conservation standard for set-top boxes. DOE has not yet proposed an energy conservation standard for set-top boxes, and any future proposed standard would not be binding on products for approximately five years after the publication of the final rule, in addition to the time that would be required to complete the rulemaking process. DOE welcomes the voluntary agreement industry has developed, but also notes that it is without the support of a subset of the participants originally involved in the negotiation.

DOE has an obligation to ensure standards maximize the economically justified, technically feasible energy savings potential identified by a thorough analysis and as part of a notice and comment rulemaking. However, DOE recognizes that there are multiple paths forward to ensure that the maximum economic benefits and energy savings from increasing the efficiency of set-top boxes are achieved, and DOE strongly encourages and will consider any non-regulatory consensus agreement as an alternative to a regulatory standard.

Question 4. Can you explain to me why new project areas such as Grid Modernization and Advanced manufacturing are being placed under the purview of Energy Efficiency and Renewable Energy (EERE)? Neither of these areas seem to match the traditional purview of that office.

For example, while I understand a portion of the focus of the Grid Modernization task is the effective integration of intermittent renewables and energy storage into the grid, but those are end use technologies and have little to do with the operation of our very complex electric grid. Shouldn't the Office of Electricity Delivery and Energy Reliability, whose expertise is the inner workings of the electric grid, seem like a natural fit for Grid Modernization? Or, if they're going to be doing all the work, why isn't the money in their budget instead of EERE's?

Answer. The Department of Energy (DOE) Office of Electricity Delivery and Energy Reliability (OE) drives grid modernization and resiliency in energy infrastructure. OE leads the Department of Energy's efforts to ensure a resilient, reliable, and flexible electricity system. OE accomplishes this mission through research, partnerships, facilitation, modeling and analytics, and emergency preparedness. The grid energy storage program is a program within OE that will have impact across the grid.

The Office of Energy Efficiency and Renewable Energy (EERE) conducts research, development, demonstration and deployment programs in the areas of renewable electricity generation, sustainable transportation, and energy-savings for homes, buildings and manufacturing to strengthen U.S. energy security, environmental quality, and economic vitality.

EERE is pursuing its Clean Energy Manufacturing Initiative (CEMI) anchored by its Advanced Manufacturing Office and with strong involvement and dedicated funding through several EERE Technology Offices. CEMI is focused on the urgent economic opportunity in U.S. clean energy manufacturing. The goals of this effort are both to increase U.S. competitiveness in the production of clean energy products and to boost U.S. manufacturing competitiveness across the board by increasing manufacturing energy productivity.

Many EERE-funded technologies are approaching direct cost-competitiveness with conventional energy technologies in the market. These end-user technologies include rooftop photovoltaics (PV), electric vehicles and automated building controls. However, mass deployment of these behind-the-meter technologies will be inhibited if they are not compatible with the grid. In the fiscal year 2014 budget, EERE proposed a cross-cutting grid integration program totaling $80 million that is not a new line but identifies $30 million each from its solar and buildings program and $20 million from its vehicles program. The aim of this program is to ensure that emerging solar, electric vehicles and automated building controls can be seamlessly inte-

grated together and compatible with the grid.. EERE and OE coordinate on grid integration issues to ensure that renewable generation and end use efforts under EERE can successfully interface with OE's grid activities

Question 5. I think we can all agree that we need to develop our energy sources in the most efficient way possible. And I think you all know that I feel we should take advantage of all the energy sources that each one of our states has available.

Well, the National Energy Technology Laboratory has released a study that shows we can almost triple the amount of oil we can get out of existing oil formations, form 24 billion barrels to over 60 billion barrels, if we just have a small research and development (R&D) program, and if we incentivize oil producers to us best practices inhow they develop these fields. There are even old oil fields in my state of West Virginia that we can get oil out of . . . about 100 million barrels worth!

These types of programs are just like the Department of Energy research that brought us the shale gas revolution: programs that focus on near term technologies which just need a bump to get across the finish line.

My question to you, Deputy Secretary, is: Why don't we have research programs that will make better use of our energy sources, like increasing the amount of oil& gas that we can recover from existing fields. I'm not sure I understand how we can spend $2.8 billion dollars on renewables and energy efficiency. Does the DOE, MR. Deputy Secretary, have any plans that you are aware of to take advantage of low-hanging fruit research opportunities? And if not, why?

Answer. The Department's2011 report—Improving Domestic Energy Security and Lowering CO_2 Emissions with "Next Generation" CO_2 Enhanced Oil Recovery (CO_2-EOR)—stated that about 60 billion barrels of additional economically recoverable oil could be provided by "Next Generation" CO_2-EOR. As a component of our carbon storage R&D, DOE is conducting research activities aimed at developing and applying the "next generation" of CO_2-EOR technologies to get more oil out of existing domestic oil fields more efficiently while permanently sequestering CO_2. The ongoing projects focus primarily on developing and testing new technologies at laboratory scale. This year, we will solicit for pilot-scale performance testing and integration of "next generation" of CO_2-EOR technologies at carbon capture and storage project sites.

Question 6. My staff informs me that during the briefing you held earlier this week a big show was made of how bio-refineries—particularly those for ethanol—were far enough along that we no longer needed to fund them. Your staff pointed to the zero'ing out of the "biorefinery" program. But now that we have your budget justification document, as of 7:25 his morning, I see that you have merely re-named the program "bioenergy" and that the budget has actually increased. Why the smoke and mirrors? And will the department be looking at the combination of coal and biomass to make liquid transportation fuels, which has shown to be a cost competitive means of producing biomass derived fuels RIGHT NOW?

Answer. The Office of Energy Efficiency and Renewable Energy (EERE), through the Bioenergy Technologies Office (previously Office of Biomass Programs), has successfully completed a decade of research, development, and demonstration (RD&D) of pioneering technologies for the production of cellulosic ethanol. Through pilot scale validation of state of the art technologies, the modeled cost of mature commercial production of cellulosic ethanol has proven to be cost competitive with gasoline. This means that after the initial build out of the cellulosic commercial industry it is expected that cellulosic ethanol will cost $2.15/gal ($3.20 gallon of gasoline equivalent). In addition, we expect the first commercial cellulosic ethanol biorefinery in U.S. history to fully come online this year. It will transform municipal solid waste and yard waste into cellulosic ethanol and clean energy, while commercial cellulosic biorefineries built by two other companies are expected to be online shortly thereafter, in 2014. Together, these three facilities will have the capacity to produce more than 50 million gallons of renewable fuels annually. It should be noted that advanced biofuels includes cellulosic ethanol, as well as renewable gasoline, diesel and jet fuels which will allow for the replacement of the entire barrel of oil. The FY 14 request will not fund additional ethanol research and development, but rather is focused on bringing the cost of production down on the remaining suite of products required to displace petroleum.

RESPONSES OF DANIEL B. PONEMAN TO QUESTIONS FROM SENATOR SCOTT

Plutonium Disposition

Question 1. How can the Administration reconcile a "slowdown" to the program that could ultimately kill the MOX project, and simultaneously pledge to uphold our agreement with the Russians?

Answer. The United States remains committed to achieving the important nonproliferation mission associated with the disposition of excess weapon-grade plutonium and to our agreement with Russia. However, considering the unanticipated cost increases associated with the MOX fuel approach and the current budget environment, the Administration is conducting an analysis to determine whether there are options to complete the mission more efficiently.

MOX Project

Question 2. How much will the slowdown of the MOX project affect its cost and schedule?

Answer. As mentioned in response to your first question, the United States remains committed to achieving the important nonproliferation mission associated with the disposition of excess weapon-grade plutonium and to our agreement with Russia. However, considering the unanticipated cost increases associated with the MOX fuel approach and the current budget environment, the Administration is conducting an analysis to determine whether there are options to complete the mission more efficiently. Cost and schedule impacts will be a central component in determining next steps for fulfilling our plutonium disposition commitments.

Question 3. What are NNSA's estimates on how much it would cost to shut down the MOX project?

Answer. NNSA does not have a current estimate of the cost to shutdown the MOX project.

Question 4. How much is the study expected to cost and where will the money come from-NNSA, NE, EM or elsewhere?

Answer. The Administration is conducting an analysis of plutonium disposition options, which is being funded primarily through NNSA.

Question 5. When is the study expected to be completed?

Answer. The Department intends to use the analysis in order to inform the FY 2015 budget.

Question 6. What are the other alternatives and are they consistent with the US-Russia agreement?

Answer. The analysis includes continuing the current path of disposing of plutonium as MOX fuel as well as other technically and financially feasible options. The U.S.-Russia Plutonium Management and Disposition Agreement (PMDA) allows for other disposition paths if agreed to by both parties.

Question 7. Will the US-Russia Agreement have to be amended if the Obama Administration shuts down the MOX project to use an alternative?

Answer. The United States remains committed to achieving the important nonproliferation mission associated with the disposition of excess weapon-grade plutonium and to our agreement with Russia. The U.S.-Russia Plutonium Management and Disposition Agreement (PMDA) allows for other disposition paths if agreed to by both parties.

Question 8. What assurance do we have that Russia will be amenable to something other the MOX process?

Answer. The U.S. will continue to engage Russia while conducting the options analysis and will work to continue progress in implementing the PMDA.

Question 9. What national security assessments will be made if the MOX project is ultimately shut down?

Answer. The Department has not cancelled the MOX project, and we cannot prejudge the outcome of the options analysis.

Question 10. What options have been previously reviewed and eliminated and what has changed since the time of those studies that these same options should be considered again? What new serious options exist today that have not already been evaluated?

Answer. As previously mentioned, the United States remains committed to achieving the important nonproliferation mission associated with the disposition of excess weapon- grade plutonium and to our agreement with Russia. However, considering the unanticipated cost increases associated with the MOX fuel approach and the current budget environment, the Administration is conducting an analysis to determine whether there are options to complete the mission more efficiently. The options include continuing the current path of disposing of plutonium as MOX fuel as well as other technically and financially feasible options. Previous reviews of the Administration's plutonium disposition strategy will be taken into account in this new analysis. Some options are being analyzed that have been considered in the past; however, the new analysis will take into consideration new data and changes in the operating plans of DOE facilities.

Question 11. How does the Administration intend to comply with the agreement with the State of South Carolina for the permanent disposition or removal of plutonium in the state?

Answer. The Department understands our commitments under current legislation, and we will look to ensure compliance with the law as we analyze plutonium disposition options.

Question 12. What will be the costs of complying with the agreement with the State of South Carolina and of non-compliance?

Answer. Beginning in 2016, current law stipulates "economic assistance" in the form of fines and penalties of $1 million per day up to $100 million per year, subject to appropriations.

Question 13. Does the Administration have a contingency for the removal of all the plutonium in the state of South Carolina?

Answer. The Department understands the provisions of current law, and we will look to ensure compliance with the law as we analyze options.

Question 14. If the MOX project is cancelled, will NNSA remove the plutonium from SRS, and if so, to where? How much will it cost to package, transport, safeguard and store this sensitive material?

Answer. The Department understands the provisions of the current law, and we will evaluate the costs associated with meeting requirements as the path forward is determined.

Question 15. If the plutonium storage facilities at Pantex are getting full, or, as the DOE IG found earlier this year may not be able to safely hold plutonium for much longer due to the age and condition of the storage bunkers, what is NNSA's plan for the plutonium at SRS and Pantex?

Answer. Although aged, the storage facilities at Pantex are safe and continue to be maintained by NNSA as mission critical assets. Additionally, a recent DOE IG study focused its concerns on bunkers which comprise a portion of the facilities used for plutonium storage at Pantex. As part of ongoing efforts to develop NNSA's plutonium strategy, we are evaluating effective ways to safely store plutonium.

Question 16. How many taxpayer dollars have been spent to date on DOE's rulemaking regarding set-top box energy conservation requirements?

Answer. To date, DOE has spent a total of approximately $2.9 million in contract funding and approximately $300,000 on Federal salary and benefits on the development of energy conservation standards and test procedure development for set-top boxes. This includes the development of the test procedure that is used to measure the energy efficiency of the set-top boxes. These test procedures are necessary as a foundation to both voluntary and regulatory programs.

Question 17. How many taxpayer dollars does DOE anticipate spending during the lifecycle of this rulemaking process?

Answer. A typical energy conservation standards rulemaking takes about 3 years to accomplish and costs approximately $3 to $5 million to complete, depending on the complexity of the rulemaking being performed. DOE is still early in the rulemaking process for set-top boxes, and acknowledges that funding of the process is subject to annual appropriations.

Question 18. Has DOE contracted any of this rulemaking out to third parties? How much has been spent on the contractors?

Answer. Yes, DOE has contracted approximately $2.9 million for energy conservation standards analysis and test procedure development for set-top boxes to date. The analysis was provided to industry and others and supported the voluntary agreement discussion. Test procedure development and finalization is necessary for both voluntary agreements and mandatory regulations. Contractors represent one way for DOE to access the expertise it needs to advance a rulemaking for the timeframe DOE requires that expertise.

Question 19. In terms of carbon dioxide emissions savings, what percentage of the United States' total carbon dioxide emissions do you anticipate DOE's set-top box energy conservation standards will save?

Answer. DOE has not proposed an energy conservation standard for set-top boxes, so it is not yet possible to estimate the carbon dioxide savings that could occur from an energy conservation standard at this time. If DOE were to propose an energy conservation standard, the proposed rulemaking would include an estimate of the potential carbon dioxide savings.

Overall appliance and equipment standards are saving consumers significant amounts on their energy bills and helping avoid significant emissions of carbon diox-

ide. Based on a recent study by Lawrence Berkeley National Laboratory[3], Federal energy conservation standards promulgated through 2011 saved consumers an estimated $42 billion on their utility bills and carbon emissions reductions attributed to the standards were realized at 176 million metric tons in 2011.

Question 20. What percentage of total global carbon dioxide emissions do you anticipate DOE's set- top box energy conservation standards will save?

Answer. DOE has not proposed an energy conservation standard for set-top boxes. If DOE were to propose an energy conservation standard, the proposed rulemaking would include an estimate of the potential carbon dioxide savings.

Question 21. If industry is willing to achieve the same cost and energy savings throughout a voluntary agreement, is it still DOE's intention to proceed with a federal rulemaking process?

Answer. DOE strongly encourages and will consider any non-regulatory agreement as an alternative to a regulatory standard. DOE recognizes that voluntary or other non- regulatory efforts by manufacturers, utilities, and other interested parties can result in substantial improvements to energy efficiency or reductions in energy consumption. In fact, as part of its rulemaking activities to consider a regulatory efficiency standard, DOE prepares a regulatory impact analysis. The regulatory impact analysis evaluates non- regulatory alternatives to standards, in terms of their ability to achieve significant energy savings at a reasonable cost, and compares the effectiveness of each one to the effectiveness of the proposed standards.

Question 22. Considering the American taxpayers are funding this federal rule making process, how do additional layers of government red-tape ultimately benefit the taxpayers considering the industry has agreed to set-top box energy efficiency standards at no cost to the taxpayer?

Answer. DOE's statutory requirement is to maximize energy efficiency that is technologically feasible and economically justified (42 USC 6295 (o) (2)). DOE's appliance standards program ensures that taxpayers are receiving cost-effective energy savings as justified by a thorough analysis of alternatives to determine which option conforms to this statutory requirement.

DOE's appliance and equipment standards program seeks to deliver significant benefits to consumers across the country across a wide variety of products. Overall appliance and equipment standards are saving consumers significant amounts on their energy bills and helping avoid significant emissions of carbon dioxide. Based on a recent study by Lawrence Berkeley National Laboratory[5], Federal energy conservation standards promulgated through 2011 saved consumers an estimated $42 billion on their utility bills and carbon emissions reductions attributed to the standards were realized at 176 million metric tons in 2011.

RESPONSES OF DANIEL B. PONEMAN TO QUESTIONS FROM SENATOR SCHATZ

Question 1. The Departments of Defense and Energy have enjoyed a fruitful relationship working together to advance energy technology research and development that promises to promote their shared interest in energy security. Since their 2012 memorandum of understanding, the departments have partnered on a number of activities, including biofuels research, lightweight materials manufacturing vehicle electrification, advanced combustion engines and energy storage. These energy investments will have lasting benefits by helping the military reduce its fuel consumption while advancing America's long-term mission to move away from its outsized reliance on oil.

How does the President's fiscal year 2014 budget support the continuing efforts in the Departments of Defense and Energy to cooperate with each other in pioneering new energy technologies that advance their shared interests in energy security?

Answer. The President's fiscal year 2014 budget includes a request of $45 million for collaboration between the Department of Defense (DoD) and Department of Energy (DOE) on the development of advanced biofuels that meet military specifications for jet fuel and diesel. If approved, the Defense Production Act will be used as the mechanism to make these funds available for first-of-a-kind integrated biorefineries that convert biomass into jet fuel and diesel. Leveraging the terms of a

---

[3] Lawrence Berkeley National Laboratory, Energy and Economic Impacts of U.S. Federal Energy and Water Conservation Standards Adopted From 1987 Through 2011, http://ees.lbl.gov/pub/energy-and-economic-impacts-us-federal-energy-and-water-conservation-standards-adopted-1987-0

[5] Lawrence Berkeley National Laboratory, Energy and Economic Impacts of U.S. Federal Energy and Water Conservation Standards Adopted From 1987 Through 2011, http://ees.lbl.gov/pub/energy-and-economic-impacts-us-federal-energy-and-water-conservation-standards-adopted-1987-0

memorandum-of- understanding, along with funds, the DOE will provide expertise in advanced bioprocessing technologies, assessments of technical and financial risks, and experience in managing merit reviews and project selections for pilot- and demonstration-scale biorefineries.

DOE and DoD are collaborating on the Smart Power Infrastructure Demonstration for Energy Reliability and Security (SPIDERS) project, along with the Department of Homeland Security and utility partners, to design and demonstrate three microgrids. A microgrid is a localized grid that can connect and disconnect from the electric grid to operate autonomously, providing reliable power to critical facilities in emergencies. The demonstrations will take place at military bases in Hawaii and Colorado. DOE is contributing $9 million towards the approximately $35 million project, with the final DOE funding increment provided in FY 2014. The SPIDERS project's objectives include demonstrating the microgrid's ability to protect critical assets from loss of power due to cyber attack, to integrate renewables and other distributed energy generation to power critical assets in times of emergency, and to sustain critical operations during prolonged power outages

The DOE Vehicle Technologies Office (VTO) has been collaborating with the Army Tank-Automotive Research, Development, and Engineering Center (TARDEC) through the Advanced Vehicle Power Technology Alliance (AVPTA) to share technical information, avoid duplicative effort, and where there is mutual benefit, undertake joint technology development projects. In fiscal year 2013, the two organizations are jointly funding approximately $11M in projects for breakthrough techniques for dissimilar material joining, computer aided engineering for electric drive batteries, and lubricant formulations to enhance fuel efficiency.

The Advanced Research Projects Agency-Energy (ARPA-E) has and plans to continue coordinating broadly with organizations throughout the Federal government and the private sector. These coordination efforts have been especially strong with DOD, which has allowed both ARPA-E and DOD to leverage and advance their missions. These engagements span a wide range of approaches that include follow-on DOD investments in successful ARPA-E projects, holding a government-industry networking session at ARPA-E's Annual Energy Innovation Summit, inviting DOD speakers to present at ARPA-E University webinars, and ARPA-E including a U.S. Air Force officer on detail as a member of its Technology-to-Market team. More specifically, some notable engagements include:

- ARPA-E AMPED—DOD HESM.—ARPA-E's Advanced Management and Protection of Energy-storage Devices (AMPED) program is providing new technical options for the DOD Hybrid Energy Storage Module (HESM) program. The AMPED program seeks to significantly improve diagnostics to increase the performance of energy storage systems across multiple energy storage technologies. By working with ARPA-E, DOD will be able to build on ARPA-E's achievements in this area and avoided investing in duplicative efforts. ARPA-E and DOD are each contributing approximately $30 million over a three to six-year period to their respective efforts.
- ARPA-E BEETIT—Navy NAVFAC.—ARPA-E received funding from the Department of the Navy to further advance up to five of ARPA-E's Building Energy Efficiency Through Innovative Thermo-devices (BEETIT) performers. This work aims to lower energy use for things such as air conditioners on military bases as well as ultimately civilian applications.

Defense Nuclear Nonproliferation Budget

Question 2. The Department of Energy plays a critical role in America's efforts to curtail the spread of dangerous fissile material. The National Nuclear Security Administration supports a number of programs intended to safeguard U.S. nuclear facilities and help our partners and allies around the world secure their nuclear material. Yet the President's fiscal year 2014 budget reduces funding for DOE's Defense Nuclear Nonproliferation programs. Including for important efforts like the Global Threat Reduction Initiative. How will the President's fiscal year 2014 budget allow the Department of Energy to sustain its important nonproliferation work at the current reductions?

Answer. The top-line reduction in funding for GTRI is mainly the result of the successful completion of our four year surge in nuclear material removals, is consistent with the four-year plan, and reflects funding requested in FY 2013 for removal efforts that occur in early FY 2014. The FY 2014 request for GTRI's reactor conversion subprogram is a requested funding increase, supporting the establishment of a reliable domestic production capability for the critical medical isotope Molybdenum-99 (Mo-99) without the use of HEU. Decreases in radiological material protection are partially off-set by increases in cost-sharing from our volunteer do-

mestic protection partners. The schedule for program completion has been adjusted by nine years, from 2035 to 2044.

RESPONSES OF DANIEL B. PONEMAN TO QUESTIONS FROM SENATOR PORTMAN

Domestic Source of Enriched Uranium

Question 1. The United States must have the technology for a fully domestic source of enriched uranium to support our nuclear weapons program and the Navy nuclear reactors program. Secretary Chu, Assistant Secretary Lyons, and Ernie Moniz have testified to that fact before this committee. Do you agree with that sentiment?

Answer. Yes. The United States requires unobligated enriched uranium for national security missions. Unobligated enriched uranium can only be produced by using domestic uranium and domestic technology that is unencumbered by peaceful use restrictions. For this reason, the Department supports the development of advanced domestic uranium enrichment technology, which supports NNSA's national security and nonproliferation mission in several critical strategic ways.

Question 2. International treaties prevent us from purchasing enriched uranium from foreign-owned companies for military purposes. Is that your understanding?

Answer. For defense purposes the United States may only use enriched uranium that is produced using domestic uranium and domestic technology not subject to peaceful uses restrictions.

Question 3. The budget includes a 40 percent cut (from $238 million to $142 million) to the ongoing decontamination and decommissioning of the Portsmouth Gaseous Diffusion Plant. Will this reduction in funding allow the Department to maintain the Secretarial commitment for accelerated clean-up that was made public back in 2009?

Answer. The FY 2014 budget request supports workforce continuity and continues efforts to identify efficiencies to accelerate cleanup at the site.

Question 4. AMO manages important R&D programs that address technology needs at various stages of development. AMO also offers technical assistance programs to promote investment in energy efficient technologies and practices in the industrial sector. Can you please provide a complete list of every authorization for the Department of Energy's Advanced Manufacturing Office, and the date that each of these authorizations expire?

Answer. Generally, the following public laws have been cited providing authorization for Advanced Manufacturing Office (AMO) activities.

- P.L. 95-91, "U.S. Department of Energy Organization Act" (1977)
- P.L. 102-486, "Energy Policy Act of 1992"
- P.L. 109-58, "Energy Policy Act of 199"
- P.L. 110-140, "Energy Independence and Security Act of 2007"
- P.L. 112-210, "American Energy Manufacturing Technical Corrections Act" (2012) Specific provisions, with the corresponding U.S. Code citation are provided below along with any applicable time limitation. Excerpts of the statutes are also provided for additional reference:

- 42 USC § 13501(a)—The Secretary shall establish a 5-year National Advanced Materials Program . . . Such program shall foster the commercialization of techniques for processing, synthesizing, fabricating, and manufacturing advanced materials and associated components. At a minimum, the Program shall expedite the private sector deployment of advanced materials for use in high performance energy efficient and renewable energy technologies in the industrial, transportation, and buildings sectors that can foster economic growth and competitiveness. The Program shall include field demonstrations of sufficient scale and number to prove technical and economic feasibility.
- 42 USC § 13502(a)—The Secretary shall establish a 5-year National Advanced Manufacturing Technologies Program . . . Such program shall foster the commercialization of advanced manufacturing technologies to improve energy efficiency and productivity in manufacturing.
- 42 USC § 13453(a)—The Secretary shall conduct a 5-year program . . . on advanced pulp and paper technologies. Such program shall include activities on energy generation technologies, boilers, combustion processes, pulping processes (excluding de-inking), chemical recovery, causticizing, source reduction processes, and other related technologies that can improve the energy efficiency of, and reduce the adverse environmental impacts of, pulp and papermaking operations.
- 42 USC § 13456(a)—The Secretary . . . shall—(1) pursue a research, development, demonstration and commercial application program intended to improve

energy efficiency and productivity in energy-intensive industries and industrial processes; and (2) undertake joint ventures to encourage the commercialization of technologies developed under paragraph (1).

- 42 USC § 16191(a)—The Secretary shall conduct programs of energy efficiency research, development, demonstration, and commercial application . . . Programs under this part shall include . . . advanced technologies to improve the energy efficiency, environmental performance, and process efficiency of energy-intensive and waste-intensive industries; advanced control devices to improve the energy efficiency of electric motors. and technologies to improve the energy efficiency of appliances and mechanical systems for buildings in cold climates, including combined heat and power units and increased use of renewable resources, including fuel.
- 42 USC § 17111(b)—The Secretary shall establish a program under which the Secretary, in cooperation with energy-intensive industries[7] and national industry trade associations representing the energy-intensive industries, shall support, research, develop, and promote the use of new materials processes, technologies, and techniques to optimize energy efficiency and the economic competitiveness of the United States' industrial and commercial sectors.
- 42 USC § 17244(a)—The Secretary shall carry out a program, to be known as the Renewable Energy Innovation Manufacturing Partnership Program . . . to make assistance awards to eligible entities for use in carrying out research, development, and demonstration relating to the manufacturing of renewable energy technologies.
- 42 USC § 12005(b)(1)—The Secretary shall solicit proposals for demonstration and commercial application projects for renewable energy and energy efficiency technologies . . . Such projects may include projects for—(i) the production and sale of electricity, thermal energy, or other forms of energy using a renewable energy technology; (ii) increasing the efficiency of energy use; and (iii) improvements in, or expansion of, facilities for the manufacture of renewable energy or energy efficiency technologies.
- 42 USC § 16197—Not later than 18 months after May 8, 2008, the Secretary shall make grants to nonprofit institutions, State and local governments, cooperative extension services, or institutions of higher education (or consortia thereof), to establish a geographically dispersed network of Advanced Energy Technology Transfer Centers, to be located in areas the Secretary determines have the greatest need of the services of such Centers. 42 USC § 6312(a)—It is the purpose of this part to improve the efficiency of electric motors and pumps and certain other industrial equipment in order to conserve the energy resources of the Nation.
- 42 USC § 13451(a)—The Secretary shall conduct a 5-year program . . . on cost effective technologies to improve energy efficiency and increase the use of renewable energy in the buildings, industrial, and utility sectors. Such program shall include a broad range of technological approaches, and shall include field demonstrations of sufficient scale and number to prove technical and economic viability.
- 42 USC § 17111(c)(1)—As part of the program, the Secretary shall establish energy efficiency partnerships between the Secretary and eligible entities to conduct research on, develop, and demonstrate new processes, technologies, and operating practices and techniques to significantly improve the energy efficiency of equipment and processes used by energy-intensive industries . . .
- P. L. 112-210, Section 7(b)(2)—The Secretary, in coordination with the industrial sector and other stakeholders, shall conduct a study of the following: (A) The legal, regulatory, and economic barriers to the deployment of industrial energy efficiency in all electricity markets.
- 42 USC § 6345(a)(1)—The Combined Heat and Power Application Centers of the Department of Energy are redesignated as Clean Energy Application Centers.
- 42 USC § 6348(a)(1)—The Secretary shall make grants to industry associations to support programs to improve energy efficiency in industry.
- 42 USC § 6349(b)(1)—The Secretary shall, to the extent funds are made available for such purpose, make grants to States which, consistent with State law, shall be used for the following purposes: (A) To promote, through appropriate institutions such as universities, nonprofit organizations, State and local government entities, technical centers, utilities, and trade organizations, the use of

[7] For the purpose of this provision "energy-intensive industries" is defined as an industry that uses significant quantities of energy as part of its primary economic activities, including—information technology, consumer product manufacturing, food processing, materials manufacturers, and other energy-intensive industries, as determined by the Secretary. (See, 42 USC 17111(a))

energy-efficient technologies in covered industries. (B) To establish programs to train individuals (on an industry-by-industry basis) in conducting process-oriented industrial assessments and to encourage the use of such trained assessors. (C) To assist utilities in developing, testing, and evaluating energy efficiency programs and technologies for industrial customers in covered industries.

(c)(3)The Secretary shall establish an annual award program to recognize utilities operating outstanding or innovative industrial energy efficiency technology assistance programs.

- 42 USC § 15811(b)—The Secretary may enter into voluntary agreements with one or more persons in industrial sectors that consume significant quantities of primary energy for each unit of physical output to reduce the energy intensity of the production activities of the persons.
- 42 USC § 16193(b)—The [National Building Performance] Initiative shall integrate Federal, State, and voluntary private sector efforts to reduce the costs of construction, operation, maintenance, and renovation of commercial, industrial, institutional, and residential buildings.
- 42 USC § 6350—

(a) Not later than 18 months after October 24, 1992, the Secretary, after consultation with utilities, major industrial energy consumers, and representatives of the insulation industry, shall establish voluntary guidelines for—(1) the conduct of energy efficiency audits of industrial facilities to identify cost-effective opportunities to increase energy efficiency; and (2) the installation of insulation to achieve cost-effective increases in energy efficiency in industrial facilities.

(b) The Secretary shall conduct a program of educational and technical assistance to promote the use of the voluntary guidelines [established].

- 42 USC § 17111(e)—The Secretary shall provide funding to institutions of higher education-based industrial research and assessment centers, whose purpose shall be—(1) to identify opportunities for optimizing energy efficiency and environmental performance; (2) to promote applications of emerging concepts and technologies in small- and medium-sized manufacturers; (3) to promote research and development for the use of alternative energy sources to supply heat, power, and new feedstocks for energy-intensive industries; (4) to coordinate with appropriate Federal and State research offices, and provide a clearinghouse for industrial process and energy efficiency technical assistance resources; and (5) to coordinate with State-accredited technical training centers and community colleges, while ensuring appropriate services to all regions of the United States.

Question 5. The Administration's Clean Energy manufacturing Initiative leaves some people with the impression that AMO is refocusing its efforts on a narrow set of technologies not applicable to the broader industrial sector. Can you please provide a detailed description of the Clean Energy Manufacturing Initiative?

Answer. The Clean Energy Manufacturing Initiative (CEMI) is a strategic integration and commitment of manufacturing efforts across the Office of Energy Efficiency and Renewable Energy (EERE). CEMI has two overall objectives:

1. Increase U.S. competitiveness in the production of clean energy products: Strategically invest in technologies that leverage American competitive advantages and overcome competitive disadvantages, and
2. Increase U.S. manufacturing competitiveness across the board by improving energy productivity: Strategically invest in technologies and practices to enable U.S. manufacturers to increase their competitiveness through energy efficiency, combined heat and power, and take advantage of low-cost domestic energy sources.

This initiative facilitates engagement with a wide array of relevant stakeholders, including Federal agencies, research institutions, and private sector partners to map out and implement a strategy to ensure that U.S. manufacturers are competitive in the global marketplace.

Additionally, CEMI breaks down silos among the relevant offices within EERE and the Department. The initiative includes manufacturing efforts for different technologies that are funded through individual EERE program offices. For example, the Advanced Manufacturing Office's Innovative Manufacturing Projects; as well as the Solar Energy Technologies Office's Solar Manufacturing Technology (SolarMat), are part of the larger CEMI effort.

Question 6. Does the Clean Energy Manufacturing Initiative mark a departure from the broader portfolio of technologies AMO has historically promoted?

Answer. The Clean Energy Manufacturing Initiative (CEMI) does not mark a departure from the broad portfolio of technologies that the Advanced Manufacturing

Office (AMO) has historically promoted. AMO is focused on improving the efficiency of several energy intensive industries, improving the efficiency of industry through broadly applicable industrial technologies and practices, and advancing cross-cutting manufacturing and materials innovation. CEMI has been developed to improve our coordination and our ability to engage stakeholders across the country in efforts to improve industrial efficiency and advance manufacturing.

Question 7. In this age of austerity, we need to make sure that the dollars Congress allocates are spent wisely and efficiently. One way to make sure that this happens is for the government to consult with its private sector partners. What is the Department's strategy for engaging industry stakeholders to help the Advanced manufacturing Office (and other offices, for that matter) establish the direction of its R&D programs, prior to funding solicitations (RFPs) from being released?

Answer. The Department of Energy remains committed to making sound investments in advanced energy technologies that are critical to the future of American competitiveness. For example, the Department responded directly to recommendations from a July 2012 report by the Advanced Manufacturing Partnership's Steering Committee and the President's Council of Advisors on Science and Technology with proposals to establish several clean energy manufacturing institutes to bridge the gap between research and development and the marketplace. The "Report to the President on Capturing Competitive Advantage in Advanced Manufacturing" recommendations include creating a fertile environment for innovation through robust support for basic research; increasing funding for the research and development of top cross-cutting technologies that are vital to advanced manufacturing; establishing a network of Manufacturing Innovation Institutes (MIIs) as a public-private partnership to foster regional ecosystems in advanced manufacturing technologies, particularly for the more than 300,000 small and medium- sized enterprises, which often lack adequate technical resources; deepening university and industry collaboration; building excitement for and interest in manufacturing careers; and developing a high-skilled workforce through hands-on "training centers" and course development for universities and community colleges.

The Department's Clean Energy Manufacturing Initiative (CEMI) also demonstrates a commitment to consult with private sector partners. CEMI is a new initiative focused on growing American manufacturing of clean energy products and boosting U.S. competitiveness through major improvements in manufacturing energy productivity. A key component of CEMI will be a series of regional summits to gather input on manufacturing priorities, technology barriers, and opportunities for growing clean energy manufacturing competitiveness.

CEMI will also be launching new public-private partnerships focused on improving U.S. clean energy manufacturing competitiveness. For example, the U.S. Council on Competitiveness is partnering with the Department to convene a series of dialogues among government, small business, industry, research institutions and labor leaders to help develop and recommend strategies for growing the U.S. clean energy manufacturing sector.

In general, EERE convenes with a wide cadre of stakeholders to identify R&D priorities relevant to domestic energy systems and taking into account international supply chains. Prior to developing funding opportunity announcements, EERE seeks feedback from groups including industry associations and trade groups, financial institutions, nonprofit organizations, foundations, think tanks, universities and the national labs, as well as intergovernmental stakeholders. With the inclusion of these regular interactions with stakeholders, our R&D strategy for the current fiscal year fits within the Quadrennial Technology Review, which received significant input from the private sector.

Question 8. Is there an institutional process for receiving industry and other stakeholder input at AMO?

Answer. Yes, consistent with DOE and other Federal Agency practices, AMO employs a range of mechanisms to collect stakeholder input, primarily public workshops, meetings with stakeholders and Requests for Information (RFIs).

Question 9. Can you describe how this process works? Please describe the types of entities which are involved and their input is requested and received.

Answer. The Department of Energy (DOE) has held public workshops and meetings with stakeholders covering a wide variety of topics depending on the purpose, ranging from technical matters specific to individual industries to general issues that broadly impact the manufacturing sector. The meetings and workshops incorporated feedback from a diverse array of stakeholders into DOE's understanding of the manufacturing challenges facing different industries and how to focus its resources to achieve the greatest potential impact. Many of these workshops have taken place in advance of a Funding Opportunity Announcement (FOA) to ensure

that DOE has thoroughly considered and has a comprehensive understanding of the areas in which it seeks to invest its appropriations.

Recently, AMO engaged over 250 industry and academic experts through a series of workshops, each focused on a particular foundational technology. The workshops discussed the status of each technology and related R&D, technical challenges, market barriers, emerging applications, manufacturing costs and challenges, and the potential benefits of continued development.

In addition, AMO has been a primary member of the Advanced Manufacturing Partnership (AMP), a private sector-led national effort to revitalize American manufacturing launched by the President in June 2011 that has involved substantial stakeholder engagement and feedback. The Advanced Manufacturing National Program Office (AMNPO), hosted by the National Institute of Standards and Technology, coordinates federal agencies with manufacturing-related missions. AMO has been an active participant in AMNPO activities including planning, implementing, and writing reports from workshops. AMO staff led discussion sessions and helped compile feedback from over 850 stakeholders in the manufacturing community obtained through four regional "Designing for Impact" workshops hosted by the AMNPO and participated in the review of the 78 responses to a formal Request for Information (RFI) released by the AMNPO in 2012.

In FY 2014 AMO plans to release an RFI or host a workshop prior to the release of any FOAs. The intended purpose of these activities is to gain additional insight into industry's need for support of high-risk and high-reward concepts for R&D. Once the RFI process or workshop is complete and the comments analyzed, the FOA concept will be further refined and approved for the development and publication process. Through these pre-FOA processes, AMO has consistent procedures in place to obtain stakeholder feedback to help guide its investments.

Question 10. What was the degree to which the AMO received industry input on the creation of the Clean Energy Manufacturing Initiative?

Answer. The Clean Energy Manufacturing Initiative (CEMI) is a strategic integration of manufacturing efforts across the Office of Energy Efficiency & Renewable Energy's (EERE) technology offices, including the Advanced Manufacturing Office (AMO), focusing on American competitiveness in the production clean energy products and through improvements in industrial energy productivity. In developing the Clean Energy Manufacturing Initiative, EERE held multiple meetings with a range of industry stakeholders, including workshops and roundtables in Colorado and Washington, D.C. Following the Initiative launch in March 2013, the first nine months of the Clean Energy Manufacturing Initiative are planned to include extensive stakeholder engagement to further define the Initiative's goals and high-impact efforts that represent the most effective means by which to reach the Initiative's goals of manufacturing competitiveness. These engagement activities include Regional Summits; a Dialogue Series with the Council on Competitiveness; incorporation of manufacturing competitiveness into technical workshops; and individual outreach activities.

Question 11. Can you please provide a complete list of authorizations for DOE's Research Partnership to Secure Energy for America (RPSEA), and the date that each of the authorizations expire?

Answer. The Energy Policy Act of 2005 (EPAct) authorized the Secretary of Energy to establish a research program (Program) for ultra-deepwater and unconventional natural gas and other petroleum resources, including the technology challenges of Small Producers, and research by the National Energy Technology Laboratory.

Title IX, Subtitle J, Section 999B of EPAct authorized the Secretary to contract with a non- profit consortium to administer portions of the research program while maintaining ultimate responsibility for and oversight over all aspects of the Program. The consortium selected to administer portions of the research program was Research Partnership to Secure Energy for America (RPSEA). RPSEA's contract with the Department of Energy began in 2007, and RPSEA will continue to support this work until the sunset of the authority under Subtitle J, as established under Section 999F, on September 30, 2014.

Question 12. Is there an institutional process for receiving industry and other stakeholder input at RPSEA?

Answer. Section 999D of the Energy Policy Act of 2005 (EPAct) authorizes the establishment of two Federal advisory committees to the Secretary of Energy that are subject to the Federal Advisory Committee Act (FACA). The FACA sets a very high standard for transparency and inclusivity. EPACT Section 999B(e)(2)(B) directs the Secretary of Energy to submit the annual operating plan for the research program to these two Federal advisory committees, and requires these committees to provide written comments regarding the plan by a date established by the Secretary. To

date, this process has been used for the annual operation plans for 2007 through 2013. During September and October 2013, this process will be used for the eighth and final annual plan for 2014. Of note is the requirement (Section 999B(e)(2)(A)) that that the Secretary solicit written recommendations in the form of a draft annual plan from the consortium contracted by the Department of Energy pursuant to Section 999B(c)(1) to administer a portion of the research program.

Question 13. Can you describe how this process works? Please describe the types of entities which are involved and their input is requested and received.

Answer. The process for receiving industry and other stakeholder input on the annual plan includes a combination of activities led by Research Partnership to Secure Energy for America (RPSEA) in the form of advisory groups, and activities led by the Secretary of Energy in the form of Federal advisory committees established pursuant to the Federal Advisory Committee Act.

From its diverse natural gas and oil membership, RPSEA organizes a series of advisory groups to provide input and direction to its overall recommendations for its draft annual plan. This process includes program level and technical level advisory groups, and small producer and environmental advisory groups. These groups meet multiple times to review goals, project ideas, and review and recommend projects to the Secretary of Energy.

For example, in its 2009 draft annual plan, RPSEA reports that for the development of its recommendations for ultra-deepwater research, RPSEA's program advisory group and technology advisory groups combined met 29 times with 591 participants involving over 2,800 hours of time and effort to focus the 120-plus project ideas for 2007 and 2008 down to 26 ideas representing approximately $30 million dollars in research and development.

Question 14. Companies in the cable, satellite and telephone industry have developed voluntary standards to improve the efficiency of set-top boxes. What has the Department done to evaluate this Agreement, and what are its conclusions?

Answer. The Department encourages the development of market-based solutions that are a result of a consensus from all relevant parties, and has recently finalized several rules through consensus agreements. In the case of set-top boxes, DOE had a rulemaking in process, which it suspended for a six-month period in 2012 following a request from Pay-TV, consumer electronics industries, and energy efficiency advocates to provide these stakeholders time to negotiate a voluntary agreement. The Department is now proceeding with the rulemaking, with DOE issuing an initial Notice of data availability (NODA) analysis on February 28, 2013, that presents DOE's initial analysis estimating the potential economic impacts and energy savings that could result from promulgating a regulatory energy conservation standard for set-top boxes. DOE has not yet proposed an energy conservation standard for set-top boxes, and any future proposed standard would not be binding on products for approximately five years after the publications of the final rule, in addition to the time that would be required to complete the rulemaking process. DOE welcomes the voluntary agreement industry has developed, but also notes that it is without the support of a subset of the participants originally involved in the negotiation.

DOE has an obligation to ensure standards maximize the economically justified, technically feasible energy savings potential identified by a thorough analysis and as part of a notice and comment rulemaking. However, DOE recognizes that there are multiple paths forward to ensure that the maximum economic benefits and energy savings from increasing the efficiency of set-top boxes are achieved, and DOE strongly encourages and will consider any non-regulatory consensus agreement as an alternative to a regulatory standard.

Question 15. What is the Department doing to promote voluntary market solutions that save consumers money and deliver energy savings?

Answer. Through partnerships with other Federal agencies, industry, manufacturers, and researchers, DOE validates and provides informational materials on energy efficient products and appliances, energy management techniques, and building science research best practices. These voluntary market partnerships are proven to achieve significant energy and money savings by improving the efficiency of homes and buildings across our nation. DOE promotes voluntary market solutions by assuming leadership roles in initiatives and by encouraging industry and sector alliances, energy efficiency workforce certifications, decision and design tool deployment and technology, and research and development programs.

The Better Buildings Alliance (BBA) is an example of a program that continues to achieve success through voluntary partnerships with industry. The BBA has grown to include more than 200 members, representing over 10 billion commercial square feet across seven key market sectors: retail, food service, commercial real estate, public, hospitality, healthcare, and higher education. Members agree to partici-

pate in at least one Alliance activity each year and share their successes with their peers, while DOE commits to connect members with technical resources, and provide a platform for peer exchange. BBA challenges have led to the development of highly-efficient air- conditioning units for commercial buildings through the Rooftop Unit Challenge. Building off of this success, BBA has expanded the challenges to energy efficient lighting for parking garages and low-cost wireless meters. Each effort helps launch energy efficient technologies and techniques into the marketplace delivering energy savings solutions to the consumer and the building owner.

RESPONSES OF DANIEL B. PONEMAN TO QUESTIONS FROM SENATOR HEINRICH

Question 1. Section 1001 of the Energy Policy Act of 2005 established a technology commercialization fund (TCF) where 0.9 percent of the amount made available to the Department of Energy for applied energy research, development, demonstration, and commercial application for each fiscal year are "to be used to provide matching funds with private partners to promote promising energy technologies for commercial purposes." The only available public information indicates that about $14 million was spent shortly after EPAct05 implementation (2007-2008), but there is no information about subsequent spending and activities. Assuming that DOE spends roughly $3 billion per year on "applied energy RD&D" programs (nuclear, fossil, and EERE), then the EPAct-required 0.9 percent annual spending would amount to about $27 million per year. Please provide an update on annual funding and activities of this fund since 2005. What are the department's current plans to carry out the intent of congress for this fund and ensure its full implementation?

Answer. DOE's Technology Transfer Policy Board surveyed the DOE laboratories to assess activities from FY 2008 through 2012 related to commercialization of energy technologies. The survey asked for information on all CRADA projects that promoted energy technologies for commercial purposes and where DOE funds were matched by a combination of private partner funds and in-kind contributions, meaning projects that fall under a definition of technology commercialization.

The survey found that such qualifying CRADA projects exceeded the 0.9 percent threshold required, in some cases significantly, in every year but FY 2010. The survey results are summarized in a table showing overall funding for applied energy RD&D, CRADA funding, and CRADA funding as a percent of applied Energy RD&D. The information follows:

Fiscal Year	Applied Energy Budget ($ in millions)	DOE CRADA Funds (matched by outside partners) ($ in millions)	CRADAs as a percent of Applied Energy
2008	2,496	63.50	2.54%
2009	3,919	35.78	0.91%
2010	3,176	23.60	0.74%
2011	2,972	54.76	1.84%
2012	3,205	35.47	1.08%
Total	15,768	213.11	1.35%

Even though CRADA funding in 2010 is slightly less than the 0.9 percent requirement, the percentage of CRADA funding from 2008-2012 is well above the requirement. The Department will continue to track those projects across the Department that qualify as Technology Commercialization projects and report our results annually.

Question 2. I understand the position of Technology Transfer Coordinator created by Section 1001(a) of EPAct05 is currently vacant, what are the department's plans to fill this position?

Answer. Per EPAct05, the Technology Transfer Coordinator is appointed by the Secretary, so this decision will be addressed after the new Secretary is confirmed. In the interim, Technology Transfer Policy Board members across the Department's organizational elements continue to support the Department's technology transfer mission.

Question 3. As part of the FY13 National Defense Authorization Act, Section 3165 established a pilot program for the purpose of accelerating technology transfer from

the national security laboratories to the marketplace. What are the department's plans to implement this program?

Answer. NNSA Technology Transfer activities will utilize this pilot program to create outreach opportunities. It will be used to promote and advertise technologies developed within the NNSA weapons programs that are of interest to the industrial and academic communities. NNSA will collaborate with these organizations for eventual commercialization. NNSA laboratories have a long relationship with Technology Ventures Corporation of Albuquerque, NM, working with Sandia National Laboratories, to develop technology transfer programs over the years. NNSA will work with Technology Ventures to seek out and utilize opportunities at new and unique venues to present developed technologies to the public. NNSA has been in the process of surveying laboratory technology transfer organizations for support and input to ideas for implementation. Activities that are underway will continue toward development of an outline for implementation and approval. The Pilot Study must be approved by the Technology Transfer Coordinator, however, and at present this position is vacant, which affects final implementation of the program.

Question 4. The department's Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste suggests that the first pilot interim storage facility could be in operation in 2021. What specific activities and funding levels are proposed in the budget for fiscal year 2014 to support development of the first pilot interim storage facility?

Answer. The President's fiscal year 2014 budget request includes $60 million in the area of used fuel disposition, with $30 million dedicated to research and development and $30 million for waste system design and planning.

Waste system design and planning activities will support the development of a pilot interim storage facility through the following activities: development of a consent-based siting process in consultation with stakeholders; outreach to state and tribal groups along potential transportation routes; preliminary logistical studies looking into the infrastructure and capability requirements of taking delivery of used fuel from shutdown reactor sites; and developing high-level design concepts. Research and development activities that also support the development of a pilot interim storage facility include studies on the performance of used nuclear fuel in storage for extended periods and the performance of fuel in long-distance transportation. These research and development activities are budgeted to cost $12.8 million, bringing the total activities to support development of the pilot interim storage facility to $42.8 million in fiscal year 2014, in anticipation of authorizing language from Congress.

Question 5. The Blue Ribbon Commission calls for a consent-based approach that will likely require considerable engagement with communities and states that may be interested in hosting an interim storage facility. Does the department's strategy for siting nuclear waste storage facilities include providing federal grant funding directly to states in FY 2014 or in future years to assist them with their own assessments and evaluations?

Answer. Prior to the passage of legislation, the Department is undertaking only generic, or non- site specific activities, including research into generic geologies for disposal, high-level waste management system planning, and transportation equipment design and certification. The Department is also laying the groundwork for the new management entity to be able to execute a consent-based siting process, by gathering lessons learned from previous efforts in the United States and around the world and by beginning to engage stakeholders from state and community groups on how a consent-based process should work. Full participation from the full range of stakeholders is critical to the success of any consent-based process.

Question 6. The department's Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste suggests a permanent geologic repository would be in operation in 2048. What specific activities and funding levels are proposed in the budget for fiscal year 2014 to support the development of a permanent geologic repository?

Answer. The Department is undertaking a number of activities in FY 2014 to support the development of a geologic repository. Many activities being undertaken to support development of a pilot interim storage facility are also applicable to the development of a repository, including transportation planning and outreach, development of a consent- based siting process, and development and certification of transportation equipment. These activities total approximately $10 million in the President's budget. In addition, the Department will conduct research and development activities related to disposal in the areas of generic geological formations, including alternative natural systems and engineered barriers, and deep borehole disposal, totaling $17.2 million.

Question 7. As I understand it, disposal of defense wastes alongside commercial wastes is DOE's current policy in accordance with the 1985 decision to use a single repository for both commercial and defense high-level wastes. The Blue Ribbon Commission recommended a reassessment of this policy. What are the department's plans and likely time frame to reassess the issue of "co-mingling" wastes in a repository?

Answer. The Administration's Strategy noted that the commingling of commercial and government-managed wastes would be the subject of analysis going forward. Consistent with this, the Department is undertaking preparatory technical evaluations now to prepare for a reassessment of the commingling policy. Specifically, the Department is looking to entire current and projected inventory to determine whether and what types of used fuel lend themselves to disposal in specific geological formations—whether salt, granite, clay, shale, or deep borehole disposal. This study will also include an examination of government-managed used fuel and high-level radioactive waste. This study is expected to be completed in 2013 to facilitate future decision-making.

Question 8. The possibility of producing electric power from fusion energy has been suggested since the 1950s. Fusion holds the promise of a carbon-free energy source with a virtually unlimited supply of fuel. However, I'm concerned the Office of Science's budget doesn't adequately support a domestic fusion research program. Are we in danger of losing our leadership role in fusion research and graduate training programs?

Answer. The Administration is requesting $458 million for the Fusion program in FY 2014, which represents the largest percentage increase of any Office of Science research program compared to the FY 2012 appropriation. Domestic facilities and research are supported in the FY 2014 budget and can continue to be highly impactful on the world stage. While some reductions in domestic research are proposed in the FY 2014 budget, measures are also being developed that will enable U.S. researchers to stay at the forefront of the field. With over 240 full time equivalent graduate student researchers to be supported under the FY 2014 budget, support for workforce training is strong. We are making sure that U.S. scientists are consistently afforded the opportunity to engage in world-leading scientific challenges. Many of opportunities exist to leverage expertise and resources domestically, and Fusion Energy Sciences (FES) partnerships with the Basic Energy Sciences and Advanced Scientific Computing Research programs and with the National Science Foundation are supported in this budget proposal. FES is also developing a strategy to coordinate the research of the two leading FES facilities to best position the U.S. as ITER activities proceed. We must also ensure that we pay attention to investments in new fusion facilities overseas with capabilities that U.S. facilities do not and will not have. To this end, the FY 2014 budget supports international partnerships to leverage U.S. strengths, enable us to work in an international environment in preparation for ITER's research program, and yield influential research enterprises. Together, these investments will position the U.S. to sustain its international leadership in fusion energy science.

Supply of Medical Isotopes

Question 9. I understand the world is presently facing an unstable supply of medical isotopes, primarily molybdenum-99, which is used to diagnose heart disease and cancer in tens of millions of patients per year. The National Nuclear Security Administration's Global Threat Reduction Initiative (GTRI) cooperative agreement program helps to develop and implement technologies to minimize the civilian use of HEU. GTRI's assistance provides a 50-50 private/public cost share, capped at $25 million. However, the startup costs for a medical isotope plant could be in excess of $100 million, meaning the $25 million cap limits U.S. government support to less than 25 percent of project costs. Moreover, any commercial source may be in competition with foreign, government-owned research reactors, which could create and uneven playing field and discourage investment in new domestic production. Given the importance of molybdenum-99, does the Department support an increase in the $25 million cap on startup costs to allow for a full 50-50 partnership with industry?

Answer. The National Nuclear Security Administration's (NNSA) Global Threat Reduction Initiative (GTRI) has established cooperative agreements with four U.S. entities to accelerate the development of four independent non-HEU-based technology pathways to produce Mo-99. These cooperative agreements have been implemented under a 50—50 cost sharing arrangement, up to a maximum government contribution of $25 million.

Government subsidies to many of the current Mo-99 producers creates a challenge for new Mo-99 producers especially those utilizing non-HEU based production technologies. To ensure a reliable supply of Mo-99, the market needs to transition to

a full-cost recovery model. NNSA's objective is to accelerate existing commercial projects, and not to subsidize the initial capital investment to the point of causing a negative market impact in the long-term. Thus, NNSA does not support an increase to the government's maximum contribution beyond the current $25 million cap.

In addition to providing up to $25 million in support to its cooperative agreement partners, NNSA is leading the U.S. government actions aimed to transition the global production of Mo-99 to full cost recovery, with the aim to create an economic environment conducive to fully sustainable commercial Mo-99 production well into the future.

APPENDIX II

Additional Material Submitted for the Record

STATEMENT OF THE ALLIANCE TO SAVE ENERGY

INTRODUCTION

For more than 35 years, the Alliance to Save Energy has capably served as a bipartisan, nonprofit coalition of business, government, environmental, and consumer leaders committed to promoting energy efficiency worldwide to achieve a healthier economy, a cleaner environment, and greater energy security. Founded in 1977 by Senators Charles Percy, a Republican from Illinois, and Hubert Humphrey, a Democrat from Minnesota, the Alliance has worked tirelessly to improve the efficiency of America's energy resources and to make certain that energy is not wasted.

The organization is currently led by Senator Mark Warner as Honorary Chairman, and National Grid US President Tom King as Chairman of our Board of Directors. Representatives Michael Burgess, Ralph Hall, Steve Israel, Adam Kinzinger, Ed Markey, Paul Tonko and Peter Welch, and Senators Susan Collins, Chris Coons, Lisa Murkowski, Rob Portman, Mark Pryor, Jeanne Shaheen, Mark Udall and Ron Wyden serve as Honorary Vice-Chairs. Over 140 companies and organizations support the Alliance as Associates.

BACKGROUND

Rationale for Federal Energy-Efficiency Programs—Wasted energy is a costly drag on the U.S. economy, but equally important amid the ongoing economic recovery is that investing in energy efficiency—the quickest, cheapest and cleanest way to address our nation's growing demand for energy—contributes more toward meeting this need than any other resource.

The Alliance fully recognizes the significant challenges facing the federal government to reduce spending and spur economic growth. However, the organization believes strongly that failing to properly fund energy efficiency and research and development programs at the Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) at robust levels would undermine our national economic, environmental and security interests. These programs have resulted in exceptional value for American consumers and businesses as a source of savings that are spent in other economic sectors, yielding benefits far beyond their nominal outlays.

Over the last 40 years, the United States has made significant gains in energy productivity, which is the ratio of output divided by energy consumption and is a useful indicator for understanding the efficiency of an economy. According to a study conducted by McKinsey & Company, the country—with government assistance—could cost-effectively reduce energy consumption by 23 percent from the business as usual case by 2020 through an array of energy efficiency measures, saving about 9.1 quadrillion in British thermal units (BTUs) in end use energy and yielding approximately 1.2 trillion in gross energy savings.

If not for U.S. energy productivity gains since the early 1970s, our nation would have needed to consume about 50 percent more energy—with concomitant impacts on energy bills, oil imports, energy reliability and security, and environmental quality—to deliver today's gross domestic product (GDP). The following Alliance to Save Energy figure graphically illustrates the point.

A record of success—Energy efficiency and research and development programs at the Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) programs have served as a central pillar of sound U.S. energy policy. The savings achieved through the research and development of new energy-efficiency technologies through EERE programs help these technologies achieve widespread use and justify continued investment in them. McKinsey & Company estimated that $354 billion in building energy efficiency investments during 2009-2020 could yield $685 billion in savings. For manufacturing, the National Research Coun-

cil cited approximated potential savings of 14 to 22 percent of total industrial sector energy use in 2020. The savings were based on cost-effective technologies that yield at least a 10 percent internal rate of return.

At a time when too many Americans are suffering financial hardships, EERE programmatic investments offer real solutions that would not only help alleviate their economic pain, but would also deal with the short- and long-term problems associated with rising energy use.

Summary of the President's Budget Request—The President's fiscal year (FY) 2014 budget request for DOE's Office of Energy Efficiency and Renewable Energy recognizes that investments in energy efficiency are needed to reduce the burden of energy costs on consumers, make businesses more competitive, and create sustainable growth. The budget would increase investment and spur innovation in better buildings, advanced vehicles, competitive manufacturing, and smarter energy systems. In the current tight fiscal climate, greater efficiency will boost our long-term fiscal health and economic competitiveness.

Moreover, the President's call for a doubling of the nation's energy productivity by 2030, consistent with the Alliance Commission on National Energy Efficiency Policy's Energy 2030 report, is clear acknowledgment of the power of energy productivity and its ability to address economic, environmental, and national security concerns. The addition of $200 million for an energy productivity "Race to the Top"—also in the Energy 2030 recommendations—reaffirms the integral role that state energy efficiency policies play in our national energy system and thus in reaching our economic, environmental, and security goals. The Alliance looks forward to engaging the Administration and the Committee in a bipartisan manner to help design the Race to the Top, implement effective research and development investments, reform efficiency tax incentives, and address other areas in the budget.

Several recent analyses show that hundreds of billions of dollars of investment are needed to reduce the energy waste in our country and its hindrance on consumer pocketbooks, economic productivity, the environment, and national security. An analysis by the Rhodium Group for the Alliance's Commission finds that doubling energy productivity would require investment of $166 billion each year through 2030, but would avoid $327 billion a year above those costs, save the average household $1000 a year, add over a million jobs, and reduce both carbon dioxide emissions and oil imports by a third.

CONCLUSION

While the United States has made significant energy productivity progress over the last several decades, the nation cannot afford to withhold support for federal investments in energy efficiency. Heightened international economic competition; stresses on American energy, transportation, and other physical infrastructure; continued economic and geopolitical vulnerabilities to energy price shocks (despite increased North American oil and natural gas production); and multiple environmental challenges associated with energy all indicate a necessity to strengthen U.S. efforts to enhance energy productivity. To that end, the President's FY 2014 budget for the U.S. Department of Energy recognizes that investments in energy efficiency are needed to address high energy costs, improve our national energy security and reduce the harmful environmental impacts associated with the production and use of energy.

BLOOMBERG ARTICLE

CANADA SEEN BEATING U.S. IN $150 BILLION ASIA LNG RACE

Canada is pulling ahead of the U.S. in a contest to be the first exporter of liquefied natural gas from the North American shale bonanza to Asia's $150 billion LNG market. An LNG terminal being built at a cove north of Vancouver financed by a Houston private-equity firm is scheduled to begin shipping the fuel across the Pacific Ocean in mid-2015, eight months before the first continental U.S. plant is slated to start. Canada's government has approved twice as much LNG export capacity as its southerly neighbor, evincing a friendlier attitude toward selling domestic gas to the highest bidder and positioning the nation as the go-to source of gas in North America for overseas buyers.

International energy giants from Exxon Mobil Corp (XOM). to Malaysia's Petroliam Nasional Bhd (PET) are considering terminal projects in western Canada to supply Asian utilities and factories that are paying more than four times the price of U.S. markets. Chevron Corp (CVX). said it's focusing all of its North American LNG efforts north of the U.S. border because of the more favorable regulatory climate and closer proximity to Asia, making exports more profitable for producers.

"The smart money is going to Canada" to export LNG, said Michelle Foss, chief energy economist at the Center for Energy Economics at the University of Texas' Bureau of Economic Geology. "They don't have any objections to exporting gas and it's closer to Asia, which cuts down on shipping costs."

Project Risks

Taking gas from the vast fields dotting Alberta and British Columbia and superchilling it to a liquid for ocean-going tankers has price risks. LNG terminals can cost tens of billions of dollars to construct and take decades to pay returns. That can make a facility obsolete should internal North American demand and prices escalate to where domestic sales become more profitable than exports, Foss said.

In addition, Canadian LNG developers counting on the tradition of basing sales on world oil prices could be undercut by Louisiana and Texas-based producers planning to link contracts to lower-cost Gulf Coast gas markets, said Dale Nijoka, global oil and gas leader at Ernst & Young LLP. Three gas export projects have received permission to ship LNG from Canada's Pacific Coast to destinations such as Japan and China, compared to just one in the U.S., on the Gulf Coast, according to data compiled by Bloomberg. In the U.S., policymakers and industry leaders are divided over how tightly to control gas exports for fear of driving up domestic prices for the power-plant and furnace fuel.

Doubling Demand

"In the long term, Canada, which carries lower political risk, is probably more positively seen than the U.S. projects," Asish Mohanty, senior LNG analyst at Wood Mackenzie Ltd. in Houston, said in a telephone interview. "The political risk of U.S. LNG is probably going to outweigh the benefits."

Energy companies chill gas to -160 degrees Celsius (-256 Fahrenheit) to create a colorless liquid 1/600th of its original volume for long-distance shipment aboard tankers twice as long as Seattle's Space Needle is high. Worldwide gas demand is expected to more than double by 2035 to 6.6 trillion cubic meters (233 trillion cubic feet) a year, according to the International Gas Union, a trade group based in Vevey, Switzerland and Oslo.

Global demand will begin to outpace LNG supplies around the end of this decade and may exceed production by 100 million metric tons (4.87 trillion cubic feet) annually by 2025, Chevron Chairman and Chief Executive Officer John S. Watson told analysts in New York last month.

'World Class'

Asia leads the world in the growth of demand for LNG as Pacific Rim economies expand power generation and energy-hungry manufacturing sectors, Watson said during the March 12 event.

Kurt Glaubitz, a Chevron spokesman, referred a further query about Canada's LNG outlook to comments from Jay Johnson, Chevron president for Europe, Eurasia and the Middle East, at the same analyst meeting, when Johnson lauded Canada's "world class" gas resources.

"With such a large resource base, these fields could readily support additional LNG trains," Johnson said.

Aaron Stryk, a spokesman for Exxon, declined to comment for this story.

"Petronas looks towards Canada's stable fiscal and regulatory regime as a positive environment for investments of this magnitude," as well as the country's "vast" gas supply and short shipping times to Asia, Michael Culbert, chief executive officer of the company's Canadian unit, said yesterday in an e-mail.

The Asia-Oceania region, excluding Australia, imported 8.847 trillion cubic feet of gas in 2011, the most recent year for which data was available, according to the U.S. Energy Department in Washington. At the $16.50 per million British thermal units that Japanese importers are paying for some supplies, that regional gas market has an annual value of $150 billion.

Market Reversal

As recently as five years ago, explorers and investors from ConocoPhillips to billionaire investor George Kaiser were predicting the U.S. would need to import LNG to meet domestic demand as output stagnated from its aging fields. Dow Chemical Co (DOW)., Chevron and Total SA (FP) were among the heavyweights that signed long-term contracts for LNG import capacity along the Gulf Coast.

At the same time, a then-little-noticed revolution in drilling and hydraulic fracturing was under way that subsequently vaulted North American gas production to a record high, saturating local markets, collapsing prices and prompting would-be importers to look overseas for an outlet for swelling fuel supplies.

U.S. Delays

After issuing the first permit to export continental U.S. gas to nations without free-trade agreements almost two years ago, the federal government suspended reviews of all other applications so it could study the potential impacts of overseas sales on domestic energy prices. There are now 19 proposed U.S. LNG projects awaiting export permits, with the longest on hold for 28 months.

In contrast, Canada, which has seen a similar surge in gas production, issued its third LNG export license in February for a project led by Royal Dutch Shell Plc (RDSA) in British Columbia. All together, the trio of approved Canadian projects will have the capacity to ship 4.66 billion cubic feet of gas a day, more than double the 2.2 billion cubic feet of capacity that has been permitted in the U.S., according to data compiled by Bloomberg.

Asian energy consumption trends will determine the number of LNG terminals that get built in Canada, where the gas endowment is so large the government has little reason to restrict exports, Joe Oliver, the nation's natural resources minister, said in an interview in Vancouver.

Abundant Supply

"We have so much gas in relation to what we need. There are estimates that we've got between 100 and 200 years of domestic supply," Oliver said, pointing five export projects that may move ahead. "If they all do, it's still considerably less than the amount that would start to impinge on our domestic needs over the long term."

Douglas Channel Energy Partnership plans to begin shipping as much as 700,000 tons of LNG annually from a floating plant near Kitimat, British Columbia, in mid-2015. The project is a joint venture of the Haisla Nation aboriginal community and LNG Partners, a Houston-based buyout firm led by Thomas and Glenn Tatham.

Thomas Tatham is the former chairman and CEO of Deeptech International Inc., an offshore energy explorer that also operated what once was the largest network of Gulf of Mexico gas pipelines. Deeptech sold to El Paso Energy Corp., now part of Kinder Morgan Inc., for $298 million in 1998, according to data compiled by Bloomberg. Tatham did not respond to an e-mail seeking comment.

Cheniere Timing

Douglas Channel's closest U.S. competitor, Cheniere Energy Inc., won't be finished building its first LNG export module until February 2016, according to a March 20 filing by the Houston-based company with the Federal Energy Regulatory Commission in Washington.

"The race is on and governments need to recognize that and take some steps but industry, really, at the end of the day, is going to drive this," Jim Prentice, senior executive vice president and vice chairman at Canadian Imperial Bank of Commerce, said in an interview in Vancouver.

Watson, whose San Ramon, California-based company is building $85 billion in Australian LNG export terminals and plans to begin shipping LNG from Angola by July, said Canada is a better place than the Gulf Coast to liquefy and ship the fuel. He cited western Canada's relative nearness to Asian markets and a political environment where objections to gas exports are largely absent.

Chevron Focus

"One of the things attracting us to Canada is that it's already a natural resources exporting country," Watson said during a meeting with reporters after his presentation to analysts. "We've decided that Canada is going to be the focus of our North American LNG efforts."

Chevron agreed in December to buy a 50 percent stake in the Kitimat LNG project near the Douglas Channel project. The Horn River and Liard gas fields that will supply Kitimat may hold more than 50 trillion cubic feet of gas, Watson said, or enough to supply South Korea's current level of imports for 29 years.

BG Group Plc (BG/), a U.K.-based producer of LNG from the Middle East and Caribbean, has proposed a gas-export project for Prince Rupert, British Columbia. Exxon, the world's largest energy company by market value, also has said it's considering LNG exports from the same area. Partnerships between AltaGas Ltd (ALA). and Idemitsu Kosan Co (5019)., as well as Cnooc Ltd (883). and Inpex Corp. are also studying projects. Pricing Contracts A key element of making Canadian LNG profitable will be multi-decade contracts indexed to world crude prices rather than North American gas, Watson said. Oil-linked prices are the only way to ensure enough cash flow to justify the expense and time involved in constructing LNG complexes that cost tens of billions of dollars, he said.

The LNG industry has used crude-linked prices since its inception a half-century ago in Algeria, Ernst & Young's Nijoka said. Unlike gas, oil was a globally-traded

commodity with transparent price-discovery mechanisms anyone could monitor anywhere in the world, he said.

Cheniere has bucked the rest of the LNG industry by basing contracts on the U.S. benchmark price from the Henry Hub pipeline nexus in Erath, Louisiana. The Henry Hub price has averaged $3.46 per million British thermal units this year, one- fifth the rate Japanese utilities pay for LNG imports from major sources such as Qatar and Indonesia, according to data compiled by Bloomberg.

Holding Out

Gas buyers in Asia and elsewhere probably will migrate to more Henry Hub-based pricing as existing long-term, oil-indexed contracts expire, Nijoka said. Energy producers will resist as long as they can to protect profits, he said.

"These companies like the idea of oil-based pricing because it gives them a lot more money, but the Asian buyers are pretty shrewd," Nijoka said.

Despite the steep discount of U.S. gas to international prices, many Asian LNG importers may prefer to retain crude- linked contracts to avoid the volatility of domestic U.S. energy markets that can be roiled by hurricanes, winter storms and heat waves, said Betsy Spomer, senior vice president of business development at BG Group (BG/).

"Oil, as an index, has been robust for a long time, primarily because it's a truly global commodity that is transparent and can't be manipulated," Spomer said at an LNG conference in Vancouver earlier this year. "You can't find a coal index that has the same characteristics, and does Henry Hub really make sense in Tokyo?"

○